

Master's thesis  
Department of Media  
Graphic Design  
School of Art, Design and Architecture  
Aalto University

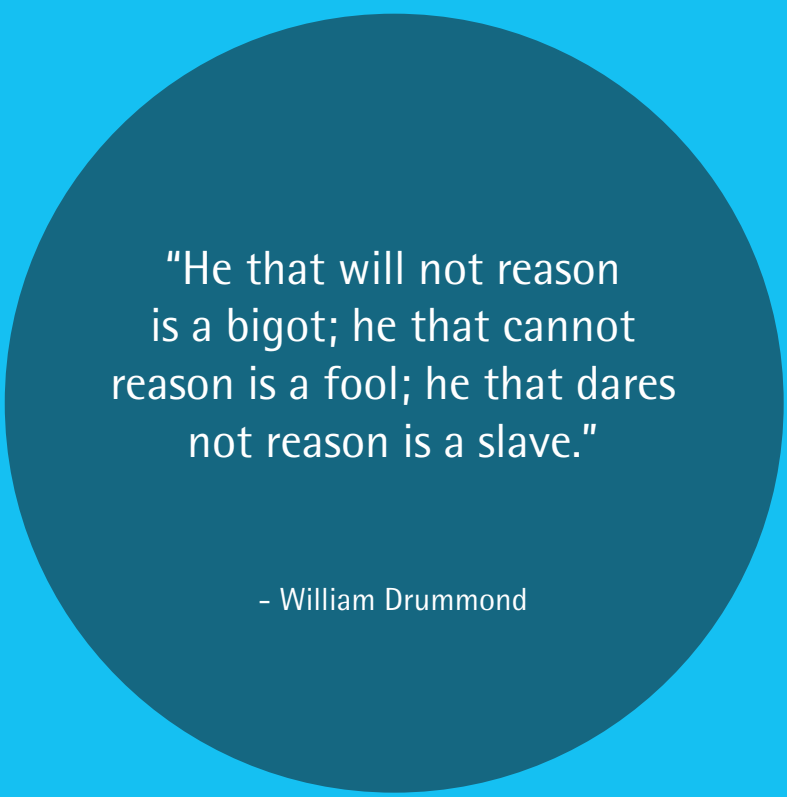
Lee Yen Yeo  
February 2013

# utopia

can we achieve it?

Can we own the latest mobile phone technology,  
reduce e-waste generation and  
keep mobile business viable, simultaneously?





"He that will not reason  
is a bigot; he that cannot  
reason is a fool; he that dares  
not reason is a slave."

- William Drummond

## Acknowledgements

I would like to thank Marjatta Itkonen and Kirsi Niinimäki from Aalto University, School of Arts, Design and Architecture for their support, guidance and comments in the process of this research.

Master's thesis  
Department of Media  
Graphic Design  
School of Art, Design and Architecture  
Aalto University

Lee Yen Yeo  
February 2013

Design by Lee Yen Yeo  
Printed by Kopio Niini Oy, Finland

The paper used for this thesis is Cocoon Offset which is a 100% recycled paper.

## ABSTRACT

This research is dedicated to find a sustainable solution to reduce mobile phone consumption without harming the mobile phone business. A utopia whereby consumers continue to own the latest piece of mobile phone technology, mobile phone manufacturers continue to make profits and yet not having a negative impact on our environment.

Using empirical research method as the framework, I studied existing literature on current mobile phones consumption system through the business models employed by mobile phone manufacturers and operators; analysed mobile phone consumption lifecycle - from manufacture to purchase to usage to replacement of mobile phones; explored issues surrounding electronic waste (e-waste) and evaluated consumers' consumption needs and desires relating to mobile phone technology.

Henceforth, diagnosis of issues regarding mobile phones consumption system will be identified, thus created a platform for further exploration and discussion of my hypothesis. Which in this case was the introduction of the Three 'R's strategy (reduce, reuse and recycle) into the mobile phones consumption lifecycle. An assessment via online survey was conducted to examine if the hypothesis can accomplish reduction in mobile consumption without causing detrimental impact to the mobile phone business.

The data and analysis from the survey showed that with the introduction of the Three 'R's strategy into the mobile phones consumption lifecycle, mobile phones consumption will be significantly reduced and thus able to slow down e-waste generation. More importantly, mobile phone sales and profits will not be compromised and consumers continued to enjoy the latest mobile phone technology.



Photo courtesy of Flickr user Sascha Pohflepp

"Our economy  
is based on spending  
billions to persuade people  
that happiness is buying things,  
and then insisting that the only  
way to have a viable economy is  
to make things for people to buy so  
they'll have jobs and get enough  
money to buy things."

- Philip Slater



Photo courtesy of Demotix photojournalist David Whinham



# CONTENTS

**5** Abstract

**12** Introduction

Part 1 - What is the problem?

**21** 1. Human-object relationship

**30** 2. Business agenda

**39** 3. Recycling is not the solution.

Part 2 - Why is there a problem?

**49** 4. Consumers' dilemma

**54** 5. Looking back, moving forward

Part 3 - Put it to test.

**71** 6. Look deeper (the questionnaire)

**80** 7. Insights (results and analysis)

**108** Conclusion and Recommendation

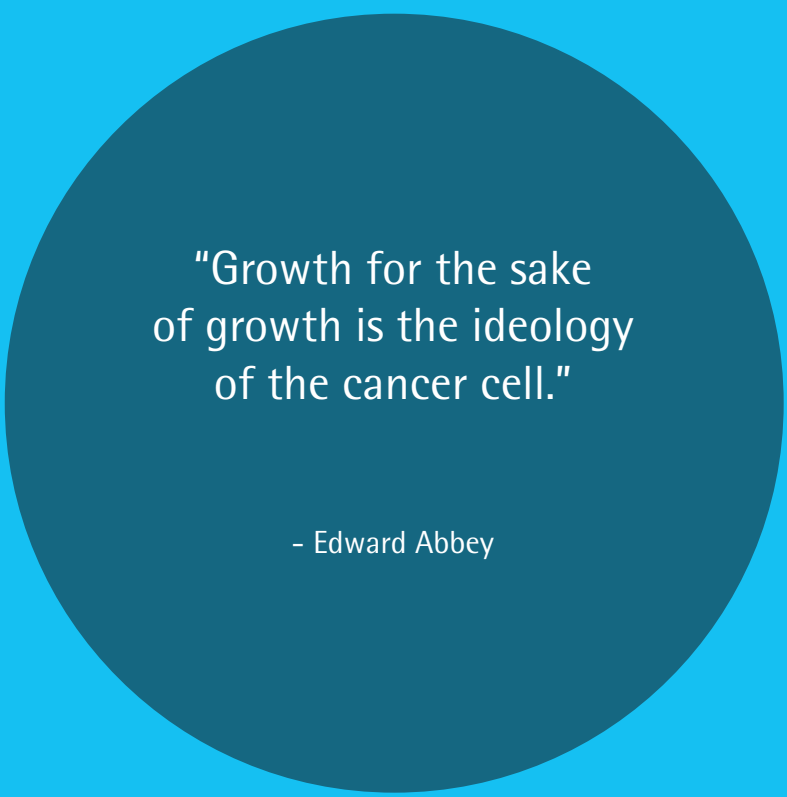
**121** Endnotes

**135** Appendices

**147** Bibliography



Photo courtesy of Getty Images For Nokia by Jason Kempin



"Growth for the sake  
of growth is the ideology  
of the cancer cell."

- Edward Abbey

## INTRODUCTION

The purpose of this research is to find a sustainable solution to reduce mobile phone consumption without hurting the business. A solution that benefits consumers, businesses and environment. The focal points of this research are on systemic issues surrounding the way we consume mobile phones, how mobile phone businesses operate and current recycling initiatives. I will explore these points from various angles, using existing studies and understandings of the fundamental issues in electronic waste (e-waste); mobile phone consumption lifecycle - from manufacturing to purchasing to usage to mobile phones replacement; and current business models employed by mobile phone manufacturers and operators. My intention for this exploration is to create a platform for discussion and evaluation of current theories / solutions and introduction of my hypothesis.

Rampant consumption of electronics and rapid generation of e-waste prevails in modern times largely due to consumers discarding products before they are worn out. This is partly due to inevitable technological advancement and partly manufacturers' deliberate attempt of planned product obsolescence. The United Nations estimates that up to 50 million tonnes of e-waste may be generated in the world each year.<sup>1</sup> Over 90 per cent of the natural resources taken out of ground become waste within three months.<sup>2</sup> In this development lies a huge problem: waste that contains toxic substances such as plastic, metals and other chemical compounds remains on our planet for eternity due to microbial decomposer inability to recognise these substance and therefore fail to degrade to their basic form.<sup>3</sup>

Electronic products improve and intensify our lives in many different ways, particularly mobile phone. It is an essential part of our lives as our source of entertainment, connection to the world and personal computer, all in one device. According to the International Telecommunication Union (ITU) 2011 studies, there were 5.9 billion

mobile phones subscriptions worldwide.<sup>4</sup> The 'International Comparisons: The Handset Replacement Cycle' study conducted by Recon Analytics in 2011, showed that average mobile phones replacement in America happened every 2 years, and most of the time, phones that were replaced were in good working condition.<sup>5</sup> And yet, according to Nokia research in 2008, merely 3%\* of the entire world's population recycled their old phones.<sup>6</sup> It is estimated that 130 million mobile phones end up in landfills just in United States alone.<sup>7</sup> These statistics paint a grim picture of our consumption of mobile phones and their impact on our environment. By rapidly changing and throwing away mobile phones, we are wasting finite resources such as minerals and precious metals that are needed to manufacture these phones, and at the same time we are also creating e-waste problems. In the light of current development, it is an imperative to look into finding a solution to stop generating more e-waste.

Planned obsolescence, the holy grail of ensuring thriving business, was conceived in 1932 by Bernard London to counter the great depression of the world's economy. In his proposal, he planned to have the government imposed a legal obsolescence on consumer products in order to stimulate and increase consumption. The strategy is simple: to shorten the replacement cycle of products by having consumers desire to replace old with new sooner than it is necessary. This is executed through products that are designed to break easily or to go out of style quickly.<sup>8</sup>

Mobile phone technology lies in the fore-front of a fast-paced and competitive industry. Market success relies heavily on phones that are made obsolete by developing incremental improvements to function and style, so to generate long-term sales volume. Consumers today are

---

\*Disputable data: Nokia consumer's website claimed 9% of the people recycled their phones as of 2012, whereas their research conducted in 2008 said that there are 3% of the world's population recycled their phone. And because I couldn't find legitimate research documents to back-up their latest claim, I chose to use their 2008 research data, which in this case - 3%.

conditioned to engage with mobile phones on a short-term basis. A mobile phone quickly lost its appeal the moment a newer model hits the stores. Replacing old with new has become our new material culture. Problem is, now we are doing so with materials that are meant to withstand time, particularly in the issues of mobile phone replacement, hence creating e-waste issues that demand our attention.

Environmental concern is nothing new, awareness of human impact on the environment was recorded as far back as 13th century by German theologian Meister Eckhart. In the late 19th century Britain, connections between the emergence of materialism and environmental decay were acknowledged and permeated the creative practice of design. In the early part of post-industrialisation, concerned and enlightened industrialists such as William Morris and many others initiated first step towards a sustainable future.<sup>9</sup>

Decades on, many approaches to sustainable design have circulated the creative arena. One in particular is known as 'Design for X' (DfX). DfX strategies involve design for disassembly, design for recycling and design for re-use. On top of these, there is an extensive palette of low-impact materials such as recycled polymers, biodegradable plastics, energy efficient structural cardboards, etc. These array of solutions and materials help designers achieve elegant, efficient and responsible design to slow down environmental decay. Likewise, phone manufacturers spent top dollars, focusing their research and development on having their next phone produced entirely on recycled materials and/or making phone parts more recyclable. Despite efforts on sustainable phone design, consumers will continue to replace their mobile phones rapidly, wasting resources but now with recycled materials. In short, design to be recycled is design for the dump.<sup>10</sup>

Current sustainable efforts on mobile phones rely entirely on having products brought back to manufacturers for recycling. This approach

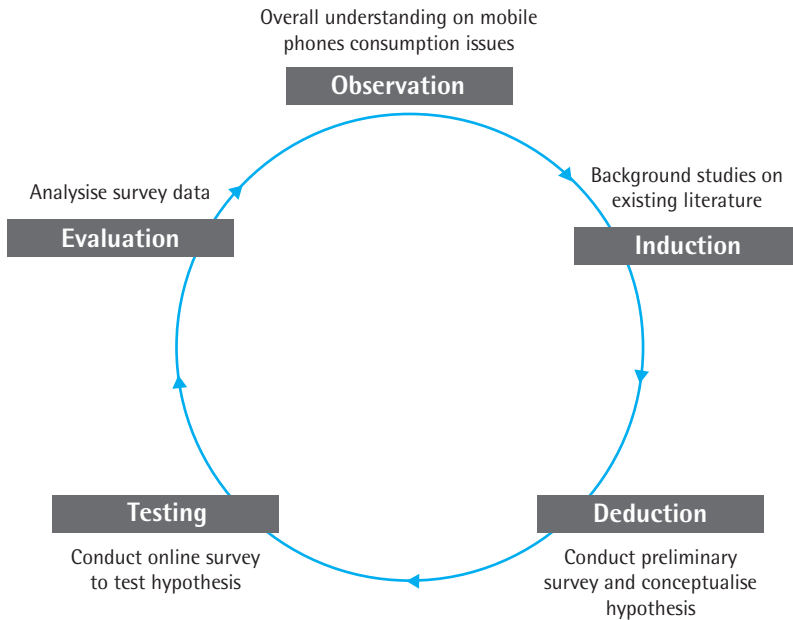
lacks philosophical depth and therefore the issue is dealt with on a superficial level, the core of ecological crisis often overlooked. Here lies two problems with current approach. Firstly, consumers do not conscientiously bring their phone back for recycling.<sup>11</sup> Secondly, recycling may just provide an ethical liberation to consumers' conscience and in doing so, encourage them to replace their phone more often than necessary and thus generate more e-waste.<sup>12</sup>

Instead of looking deeper into the fundamentally flawed system (mobile phone consumption lifecycle) and understanding the root of the problem, manufacturers are attending the periphery which is limiting and impedes real progress in finding a solution. It is no surprise why mobile phone manufacturers are more inclined to drive recycling initiatives, it is definitely more compatible with their business growth. The idea of responsible consumers who consume within their needs and not more, must be an intimidating thought to many mobile phone manufacturers. However, the adequacy of conventional capitalism must be questioned: how long will a business driven by stimulated consumer demands last, especially when our world's resources are not infinite.

There are a few fundamental issues here that we have to look into simultaneously. What drives mobile phone replacement among consumers? What is sustainability development, particularly in mobile phone industry? How can mobile phone manufacturers continue to make profits if phone replacements were to slow down significantly? These are the questions and issues that I will look into in this research, in hope to find that utopia where consumers continue to own the latest piece of technology, mobile phone manufacturers continue to make profits and yet not having a negative impact on our environment.

Using empirical research method as the framework, I have divided my research into four parts. In part one, I will study and present existing literature on current mobile phones consumption system through

## Empirical research method






the business models employed by mobile phone manufacturers and operators; analyse mobile phone consumption lifecycle - from manufacture to purchase to usage to replacement of mobile phones; explore issues surrounding e-waste and evaluate consumers' consumption needs and desires relating to mobile phone technology. Henceforth, diagnosis of issues regarding mobile phones consumption system will be identified, which aids the conceptualising of the preliminary survey questions.

Part two of this study will be dedicated to conduct the preliminary survey and the evaluate the results gathered. This will eventually lead to the the introduction of the Three 'R's strategy (reduce, reuse and recycle), a hypothesis which I believe will help curb e-waste generation when it is introduced into the mobile phones consumption lifecycle. The Three 'R's concept is to **reduce** mobile phones consumption by repairing and upgrading phones in terms of software and hardware. Thus, allowing consumers to **reuse** their old but newly improved devices for an extended period of time. And when consumers have repaired/ upgraded all that they could and wanted or needed a new phone, they can then return their old phones back to mobile phone manufacturers for **recycling**.

The assumptions are that with the introduction of the Three 'R's strategy into the mobile phones consumption lifecycle, we will be able to prolong the lifespan of mobile phones through constant repair and/or upgrade in software and hardware when neccessary; we will be able to create alternative, if not, an additional revenue stream for mobile phone manufacturers due to the repair and refurbishing services they rendered; we will be replacing mobile phones less frequently because of the phone repair and refurbish services undertaken, keeping mobile phones in good working condition and up-to-date with the latest technology.

In part three I will assess the viability of the Three 'R's hypothesis via an online survey that will be conducted between two countries - Finland and Singapore. The two countries were chosen for their similarities in economic structure, population size, disposable income and Human Development Index (HDI), which are strong indicators that both economies are robust and healthy, and that the population have ample and viable financial means for consumption spendings. In addition to the countries' similarities, there are disparities which can present an interesting juxtaposition in this research. Despite having similar disposable income, the replacement cycles in mobile phones are vastly different. Moreover, both countries' mobile phone operators offer different mobile phone contracts and deals notwithstanding the fact that these two countries have similar economic and technological infrastructure.

Lastly, the last segment of this research will conclude if the introduction of the Three 'R's strategy can accomplish reduction in mobile phones consumption and e-waste generation, without causing detrimental impact to the mobile phone business in their sales and profit, and simultaneously allow consumers to have and own the latest mobile phone technology. Recommendations will also be suggested for future research purposes.



"Earth provides enough  
to satisfy every man's needs,  
but not every man's greed."

- Mahatma Gandhi



## 1. HUMAN-OBJECT RELATIONSHIP

Archaeologists around the world have been trying to decipher the functions and meanings of objects in our early ancestors' life. In the 1960s, it was thought that objects in ancient times, often in the guise of tools were just means to an end in the struggle for survival. Objects created by humans were thought to have specific functions. For example, a ceramic pot for the purpose of cooking and food storage, has the intention of fulfilling just that. However, this view changed in the 1980s and there were ample evidence to convincingly argue that these objects were more than mere tools for survival. Rather they were important symbols of these early humans' social status.<sup>1</sup>

Human-object relationship is most evident in ancient burial grounds. From Maya to Egypt to China, tombs were filled with everyday objects such as bowls, combs, potteries, weaponries etc.. Objects as these early humans believed, that would help them journeyed in to their afterlife. Tombs that belonged to a wealthy and/or important individual would have jewelleries, furnitures, masks etc. found at the burial site. Archaeologists often utilised objects found at the tomb to draw conclusion in determining the buried individual's (who is buried along with those objects) identity and social status.

Liken a mirror, these objects allowed these early humans to project their values, beliefs and lifestyle onto them, and in return reflecting in validation of these early humans' existence in terms of their social status and material culture.<sup>2</sup> This human-object connection provides a constant feedback loop to the individual who is seen in possession of the object. One can safely argue that these ancient objects have transcended beyond their original functionality into powerful symbols, enriched with meanings to the living and dead alike.



1. Artefact found at Mayan tomb. Photo courtesy of Wolfgang Sauber.
2. Qin dynasty terracotta chariots and horses. Photo courtesy of Robin Chen
3. Egyptian figurines. Photo courtesy of Shawn Lipowski.

Moreover, there were also numerous findings that suggested these early humans, spent hours crafting decorative artefacts instead of hunting for food or making tools which were essential to their survival:

*Hunter-gatherers of the Upper Palaeolithic period of the late Pleistocene epoch left a rich legacy of cave paintings, tools, body adornment and wealth of other material artefacts. The Kenyan site of Enkapune Ya Muto - Twilight Cave - has turned up beads made from ostrich eggshells...*<sup>3</sup>

From these archaeological findings, we can determine that it is in human nature to consume not just matter but also the meaning of the object that human created.<sup>4</sup> Today, we continue to consume objects in ways like our ancestors, brimming with meanings reflecting our choice in life, our identity and portrayal of our image to the world. For instance, to possess a Louis Vuitton bag not only showcase the owner's good taste in quality goods but also his/her financial prowess in the ability to pursue an expensive lifestyle, thus displaying the quality of his/her life, elevating his/her social status among his/her peers.

We consume food, air, water, objects and meaning. Consumption is inadvertently a fundamental human behaviour, as natural as drawing breaths.<sup>5</sup> The problem lies not in consumption, but in over-consumption and wastage. Why are we throwing away perfectly usable, fully functional consumer goods in exchange for new ones? It is of great importance to understand why we waste before we can even think about a probable solution towards a sustainable future. We cannot discuss sustainability in consumption without understanding human's wasteful nature.

In '*Emotionally Durable Design: Objects, Experiences and Empathy*', Chapman cited that with better tools to aid our daily routine to survive, the under-stimulated mind now hungers for new stimulation, and it



Advertisement from Louis Vuitton. Photo courtesy of Louis Vuitton/Annie Leibovitz.



is found in the pursuit of material goods.<sup>6</sup> He further articulated that material consumption is driven by complex motivation stemming from the consumers' part. This motivation to consume excessively is driven by the lack of emotional durability towards consumer goods. Objects today fail to capture consumers emotionally, resulting in dissatisfaction, which in turns causing consumers to lust after newer objects and consume more.<sup>7</sup> Chapman wrote extensively on desire-based consumptions, how objects fail to capture our attention thus resulting in products being discarded before their expiry date. However, he failed to illustrate further on different types of object desirability and how this will impact on consumers' decision in acquiring newer object to replace old.

Based on Walker's research, he contended that there are three types of object categories which present varied properties when it comes to desirability issues. Walker believed that by studying these object categories, we would be able to understand why humans find some objects more enduring in terms of desirability and why some are not. This in-depth finding would lead us to understand better the type of objects which are not sustainable in their characteristics and thus resulting in humans replacing them with new. Having understood the full extent of the implication here, we might be able to find a sustainable solution in reducing over-consumption and wastage.<sup>8</sup>

In Walker's research, these three types of objects have their own unique characteristics which constitute to their unique enduring and/or non-enduring nature (Appendix I):

- **Functional objects:** include of tools, weapons, pots etc, they are generally created to accomplish practical tasks. This type of objects will be deemed useless once they fail to carried out their intended function. For example, a leaking pot would have failed its purpose to contain liquid, thus the owner might replace it with a new pot.

- **Social/Positional objects:** include items such as jewellery, cosmetics, tattoos, medals etc. They are non-utilitarian, their main purpose is to express identities and achievements and to improve appearances. As social signifiers, they portray the owners' sense of self-esteem, social acceptance and standing. These items stand the risk of being 'replaced and upgraded' when the owners' status have surpassed what the items signify.
- **Inspirational/Spiritual objects:** include fine art objects, religious icons etc. These objects convey inspiring, sacred or spiritual ideas and are not easily replaceable, in fact they grow in value with profound meaning overtime.

However, these broad categories are not adequate to describe characteristics of many objects of today. Walker realised that most objects are quite often complex and need combinations of broad categories to sufficiently describe them<sup>9</sup> (Appendix II):

- **Social/positional + Inspirational/Spiritual:** include objects such as ornaments, art pieces, souvenirs, home decor etc. They have social/positional meanings attributed to them, such as status, esteem or personal identity and they beautify the person or space. At the same time, these objects also possess inspiring, sacred or spiritual ideas. Because of the characteristics from the Inspirational/Spiritual category, these objects also possess meanings that are not replaceable and therefore prevent them from being discarded easily.
- **Functional + Social/Positional:** include consumer goods such as automobiles, watches, footwear, electronic appliances etc. Their Social/Positional and Functional values are intrinsically bound with the advancement in technology and styling, which resulted in them being outdated quickly. These mass-produced, globally distributed

and market-driven category is by far the most problematic in the issue of sustainability.

- **Functional + Social/Positional + Inspirational/Spiritual:** include religion related objects such as Muslim prayer mat, a Buddhist prayer wheel or a Jewish prayer shawl. These objects are symbolic to the persons who possessed them. These objects signify the worshippers' faith, social identity and at the same time they serve a purpose with their intended functions, hence they are considered sacred, precious and useful. Objects like these, will not be thrown away and be replaced by a newer version.

With Walker's in-depth categorisation and explanation of various objects characteristics, we learned that these characteristics can shape the way we view, use, keep and/or discard objects. Likewise, mobile phone has characteristics that will determine our consumption motivation and behaviour. It is not only a technological device to enhance our modes of communication, it is also a statement piece which showcases our identity and sense of style.

Mobile phone has every characteristic of a Functional + Social/Positional object, it has values that are intrinsically bound with the technological advances and fashion, which resulted in quick replacement as soon as a new design or technology hits the stores. It is laden with features we associated with convenience, power and style. Mobile phone coupled with high-speed wireless data networks have put the power of communication and concept of modern living in the hands of the consumers.

More than ever, consumers are enjoying new ways of communication and doing some of their daily activities in unprecedented ways. For instance, consumers now can take pictures and videos; engage themselves in games, music and movies; access private and business



1



2



3



4



5



6



7

Different types of form for mobile phones:

1. Brick. Photo courtesy of Redrum0486.
2. Taco. Photo courtesy of J-P Kärrnä.
3. Slider. Photo courtesy of Enrique Dans.
4. Flip. Photo courtesy of Ofsch.
5. Swivel. Photo courtesy of Philphos.
6. Touchscreen. Photo courtesy of Mungous.
7. Bar. Photo courtesy of Feci1024.

emails; and keep abreast of current affairs by using their phones anytime, anywhere. Through this multitude of new capabilities, mobile phones are able to engage consumers much more than any other electronic devices, giving them constant sense of control and power.

In addition to the abovementioned functional and convenient features, mobile phones also come in an array of design in the guise of colours, form factors and sizes. We can see significant reduction in phone sizes and increment of aesthetic development over time. Just the form factor itself, we have brick, bar, touchscreen, taco, flip, slider and swivel. These form factors not only ties in with mobile phones ergonomic development, they are also consistent with what are considered aesthetically fashionable at different period of time. A consumer would be considered 'outdated' if he is caught using a flip phone as oppose to a touch screen in today's fashion standard.

Mobile phones these days have gone beyond the basic fulfillment of better communication, and are designed to give market appeal among consumers using technical and aesthetic features. This provides mobile phones the characteristics that will stimulate other human needs such as 'a sense of belonging' and self-esteem'. Such stimulation drives an insatiable hunger to seek satisfaction. Undeniably, a consumer with an up-to-date mobile phone is more satisfied than those without.<sup>10</sup> This euphoria of owning the most up-to-date mobile phone is what drove consumers in constant search of their next euphoric moment, which resulted in rampant replacement of mobile phones.

## 2. BUSINESS AGENDA

Prior to the Industrial Revolution, manufacturing of goods relied heavily on humans' labour capacity. The manufacturing location usually in home settings, saw workers with hand tools producing goods on a per order basis. Changes took place with the arrival of the mid-1700s Industrial Revolution in Britain which quickly spread across the rest of Europe and North America Continents and eventually the rest of the world. The main drive of the Industrial Revolution was in its technological advancements, the ability to obtain raw materials and mass-produce goods at accelerated speed.<sup>1</sup> Now workers work in factories, using large powerful machines, mass-manufacturing large quantity of goods, often in anticipation of demands from consumers. With this comes a problem. To keep the factory running and to sustain growth of the business, distribution and sales of goods will have to keep up with the manufacturing speed. Consumers are encouraged to discard the old and replace with new at unprecedented pace. Centuries passed, businesses now have perfected the methods in making consumers do just that.

*'Pyramids of Waste'*, also known as *'The lightbulb conspiracy'*, a documentary released in 2010, disclosed how manufacturers deliberately shorten product life spans for the benefit of guaranteed consumer demand. The documentary researched extensively into how rapid replacement of goods is the driving force behind the degradation of our environment.

It all started with the formation of the international Phoebus cartel in 1924<sup>2</sup>, a collaborated effort among leading manufacturers of incandescent light bulbs such as Osram, Philips, Tungsram, Associated Electrical Industries, ELIN, Compagnie des Lampes, International General Electric, and the GE Overseas Group, to control the manufacturing and sale of light bulbs.<sup>3</sup> The cartel allegedly prevented technological advances that would have produced longer-lasting light bulbs, so to ensure continuous demand for more bulbs and long-term profits for

themselves. It is noted that bulbs produced prior to the formation of the cartel lasted more than 2000 hours, which is almost double the life span of bulbs produced after. This was the first recorded act of planned obsolescence in relation to business, before the concept was put into writing in 1932.

Bernard London, a prominent real estate broker suggested to the government in 1932 in a paper he wrote, to mandate planned obsolescence as a legal business conduct so to end world's economy depression. He proposed to have obsolescence on consumer products in order to stimulate and increase consumption. The strategy is simple: to shorten the replacement cycle of products by having consumers replace old with new sooner than it is necessary. This is executed through having products manufactured with a limited life span, so they will become obsolete or nonfunctional after a certain time.<sup>4</sup> Over the years, planned obsolescence has evolved and has taken many forms<sup>5</sup>:

- **Functional/Technical obsolescence:** is when consumer products have a built-in expected life span. These products were determined at the early product development stage as to how long they will last. This type of obsolescence is usually carried out by making repair cost comparable to replacement cost and making repairing services inconvenient. Like in the case of a malfunctioned inkjet printer, it is more economical and convenient to buy new then to repair the old printer or replenish ink cartridges. Another type of Functional/ Technical obsolescence comes in the guise of technological innovation. By introducing new technology to replace old and with the old technology lacking in the same functionality or capabilities as the new, for example, VHS Video to DVDs to Blu-ray.

imagine a phone so exclusive,  
even you don't have one.



Samsung Black Carbon™

- 3.0 megapixel camera
- 12.9 mm thin
- Global GSM quad-band

The Ultra<sup>edition</sup>



Imagine the Samsung Black Carbon™ Ultra Edition. A 3.0 megapixel camera, music player with power amp, a microSD™ slot and global GSM quad-band flexibility – all in a beautifully sculpted, stylish slim slider only 12.9 millimeters thin. Imagine a phone that keeps you off the middle of the road. With the Black Carbon, it's not that hard to imagine. [www.samsungblackcarbon.com](http://www.samsungblackcarbon.com)



Advertisement from Samsung. Photo courtesy of Samsung.



- **Systemic obsolescence:** is by altering system to make continuous usage difficult, for example, by introducing new software which is incompatible with older software, users with older software will not be able to access data created by new software versions.
- **Notification obsolescence:** is by having products informing users to buy a new replacement. For instance, disposable razors blades and/or toothbrush have colour strips that wear off or change colour overtime, prompting users to replace.
- **Obsolescence by depletion:** is when resources deplete not entirely due to usage. For example, a 4-colour inkjet printer that is pre-programmed to deplete colour inks when printing grey-scale, thus colour inks need to be replaced more frequently.
- **Style obsolescence:** is by constantly introducing new designs, coupled with aggressive marketing tactics to make the predecessors feel outdated. For example, mobile phone industries use this method to restyle the outlook of phones and giving them incremental feature enhancements, so that consumers will buy more frequently.

No matter which methods of obsolescence is applied by manufacturers, all in all, planned obsolescence is a business strategy in which a product is planned and built with obsolescence in mind since its conception, so to generate more sales, thus more profits.<sup>6</sup> To sustain business ambition and growth, companies have consumers believe that planned obsolescence is carried out so as to provide them with ever-improving products and services.<sup>7</sup> Simply put, a durable product is a business tragedy. In 1940, DuPont introduced a new synthetic fiber – nylon. Stockings made with this material not only did not run, it was so sturdy that it was seen pulling cars in the documentary '*Pyramids of Waste*'. Soon after, the chemists in DuPont were given new directive to make this fiber weaker.



Advertisement from Nokia Corporation. Photo courtesy of Nokia Corporation/Bates Advertising Singapore.

The Industrial Revolution not only brought about ways to make a product more fragile and hence disposable, it also gave rise to the advertising and marketing industry. To encourage more product consumption, advertisers used sophisticated techniques to emotionally manipulate consumers into acquiring new objects of desire.<sup>8</sup> This is done by creating powerful visuals to induce definition and alteration of consumers' sense of self. These images showed glimpse of emotional gratification of the consumers with the newly acquired products. With repeated promotion of such visual, consumers are coaxed into throwing away functioning products in exchange for new purchase. It is an endless journey towards defining a desired self through acquisition of newer, better objects of desire.

Consumerism is an encouraged behaviour. We continue to see this behaviour among consumers today, especially in economically developed countries. Among many other short-lived products, mobile phones are the most problematic. They are widely distributed, sold, used and replaced, in an average of every 2 to 4 years.<sup>9</sup> With 5.9 billion mobile phones subscriptions worldwide in 2011,<sup>10</sup> one can imagine as many as a third of these phones might just end up in the dump in the coming years!

To obtain new mobile phone sales in a competitive and saturated market, manufacturers resort to using technical and style obsolescence by applying incremental aesthetic and technological improvements on mobile phones, making old mobile phones look outdated, so to encourage replacements. This strategy combined with aggressive advertising and marketing tactics, brought about interest in new mobile phone models among consumers.

Take Apple's iPhone for example, since its first launch in 2007, Apple has launched a new model every year, delivering incremental technological improvements, such as faster processors, higher resolution screen display,



iPhone  
Apple

Advertisement from Apple Inc.. Photo courtesy of Apple Inc..

camera with more pixels and video function etc (Appendix III). In the aesthetic aspect, we can see that the newer iPhone is more streamline and less bulky as compared to its predecessors, using advance materials for its exterior. The advertisement for its first launch, the iPhone 2G, clearly appealed to the trendsetter/music lover. It featured revolutionary music functions incorporated in the phone, with capabilities to browse through music albums, select and play music at the touch of the display. With a phone which can do more than just making calls, Apple has successfully differentiated itself from the rest of the mobile phone industry, and thus revolutionised the way mobile phones were perceived and used. Subsequent advertisements of their new iPhone models appealed to the already iPhone users who lusted after a better iPhone. Using powerful advertising messages such as "The biggest thing to happen to iPhone since iPhone"<sup>11</sup>, Apple was able to capture consumers' attention and desire to replace their revolutionary iPhone with an even more revolutionary iPhone. All in all, these strategies were introduced for a single minded purpose – sell, sell, sell.

Mobile phone operators offering subsidies for new mobile phone purchases when consumers acquire new mobile subscriptions from them is one contributing factor to fast mobile phone replacement.<sup>12</sup> Research has shown that in countries where mobile operators offered contractual mobile services in conjunction with subsidised mobile phones, consumers were more likely to replace their mobile phones regularly, often coincided with the time frame of the contract agreement. In fact, subsidised mobile phone may be one of the key factor for faster replacements, as it alters consumer's perception of the price/value of mobile phone, hence finding new phone more attractive because of its affordability.<sup>13</sup>

Using Apple's iPhone sales in the first quarter of 2011 as reference (Appendix IV), one can deduce that in countries where iPhones are heavily

subsidised by mobile operators, the replacement cycles are the shortest, as compared to countries whose operators give little or no subsidy at all.<sup>14</sup>

It is apparent as to why businesses use these strategies to stimulate sales, it is solely to sustain business growth and generate more profits. In order to sell more, consumers will have to replace their mobile phones faster. It is in fact unthinkable if consumers were to do otherwise. Slow consumption will slow down production, and possibly resulted in factories closure and jobs lost, pushing the entire economy to the state of limbo. Faster replacement of mobile phones is great for businesses, unfortunately, it is undeniably bad for the environment, especially when they are not dispose properly. Rampant mobile phone replacement is more problematic than other non-electronic devices, as they contain materials that are harmful to human beings and the environment. Not to mention the precious metals we so relentlessly mined for are wasted when consumers decide to replace their old mobile phones with new.

### 3. RECYCLING IS NOT THE SOLUTION

39 /  
Utopia /  
Part 1 /  
Recycling  
is not the  
solution

Humans' obsession with objects, together with mass production and planned obsolescence of consumer goods, encourage a throwaway culture which produce tonnes of waste everyday. The United Nations estimates that up to 50 million tonnes of electronic waste (e-waste) may be generated in the world each year.<sup>1</sup> Over 90 per cent of the natural resources taken out of ground become waste within three months.<sup>2</sup> Shortage in resources becomes a harsh reality, therefore ideas of material conservation and the introduction of recycling seems sensible in today's development.

Rampant consumption of electronics and rapid generation of e-waste prevails in modern times largely due to consumers discarding products before they are worn out. More than 5% of municipal waste consist of e-waste, and yet only less than 10% are recycled.<sup>3</sup> Electronic goods often contain chemical compounds that are harmful to both humans and the environment when not properly disposed. In this development lies a huge problem: waste that contains toxic substances such as plastic, metals and other chemical compounds remains on our planet for eternity due to microbial decomposer inability to recognise these substance and therefore fail to degrade to their basic form.<sup>4</sup>

Recent studies on 34 mobile phones in 2007, concluded that there are copper, lead, nickel, antimony and zinc present in mobile phones that may seep out when not disposed properly. It is also believed that there are 200 chemical compounds present in a mobile phone that will take a toxicologist a lifetime to determine their effects on humans' health.<sup>5</sup>

United States, the largest contributor of e-waste who generates 3 million tonnes of e-waste annually<sup>6</sup>, lacks the infrastructure and facility to economically recycle discarded electronics. It is estimated that 82% of e-waste generated yearly in United States are not recycled. 50% to 80% of these were then exported to developing countries for disposal,

in the guise of 'recyclable' or 'reusable' materials.<sup>7</sup> These exported e-waste pose a huge burden for developing countries such as China, India, Ghana and Nigeria,<sup>8</sup> threatening their livelihood and poisoning their current and future generations, due to the fact that these countries lack the knowledge and facilities to properly recycle discarded electronics.

Mobile phones are the most valuable form of e-waste. It is estimated that if all phones sold in 2007 were to be recycled, it is worth 800 million Euros of precious metals.<sup>9</sup> Which is why in Guiyu, China, low paid locals, including children were seen taking electronics apart to salvage the precious metals and components within. Using primitive recycling methods, these untrained locals resorted to techniques such as burning and/or using acid to dissolve electronic parts in order to extract small quantities of valuable metals.<sup>10</sup> Children from Guiyu had been tested and found to have high levels of lead in their blood. Without proper training and protective gears, these informal recyclers exposed themselves to high level of toxins, which resulted in numerous health issues related to skin, stomach, respiratory tract and other organs.<sup>11</sup>

Transboundary shipments of waste are governed by United Nations via the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Disposal. Its main purpose is to control hazardous wastes from exporting out to developing countries where they are incapable of handling such waste properly. Under the law of this convention, exporting countries have to have a written consent from importing countries stating their willingness and ability to dispose such waste in an environmentally sound manner.<sup>12</sup>

Despite extensive research and public outrage towards the degradation of these informal recyclers living standards, developing countries continue to take in e-waste from developed countries due to attractive economic gains. There were instances whereby importing countries



were given monetary incentives for taking in e-waste from developed countries.<sup>13</sup> Developed countries such as United States are able to continue exporting hazardous e-waste to developing countries because the convention who regulates restriction on hazardous e-waste export, fails to recognise that mobile phones and most electronics contain chemical compounds that will effect the health of those who are exposed to the chemicals during the process of recycling.

Under current legislation, mobile phones and most electronics are not regulated as hazardous e-waste because the toxic substances present are concealed in the shell of these electronic products.<sup>14</sup> In this development, shipments of discarded electronics are not considered hazardous, and are allowed to be traded freely as second-hand electronics. There are evidences that shipments claimed to contain second-hand electronics bound for Africa, contains electronics that are beyond repair and are therefore not reusable or resaleable. The importing countries will have no choice but to find ways to dispose of them.<sup>15</sup>

Current legislation also fails to come to a conclusive unified view as to what is considered hazardous e-waste with no possibility of reuse or refurbishment. In United States, different member states get to decide what are considered waste and what are raw materials considered valuable for production purposes.<sup>16</sup> With most of the manufacturing activities happening in developing countries these days, it seems legitimate to send these materials to them for reuse. However, due to the very fact that these developing countries are already producing huge amount of waste from their factories contributed by their manufacturing activities, one has to ask if these countries have the capacity to take in more e-waste and process them properly without harming the environment and their people.



Informal recycler in China attempting to disassemble a mobile phone. Photo courtesy of Time Photos/Chien-min Chung

Sharing technology and knowledge is vital in fighting poverty, hunger, disease, illiteracy and other societal problems. Mobile phones are deemed to be of high value especially in countries with long distances and poor road connections. Communications technologies have become an important factor in closing the gap between rich and poor nations. In the guise of bridging the digital divide, most discarded electronics were exported out to developing countries for reuse and refurbishment purposes. The assumption that a developing country is incapable of purchasing new technology and has to rely on discarded electronics from rich nations is a huge and costly oversight.<sup>17</sup>

In recent years, we have seen explosive growth in domestic sales of electronics in the same countries who imported e-waste. In China, new personal computer sales quadrupled from 5 million to 20 million units during the period of 1999 to 2007. In India, new personal computer sales rose from 1.6 million to 5.4 million units in the span of 5 years.<sup>18</sup> Surge in domestic sales has resulted in the increase of e-waste in these developing countries. According to the Nations Environmental Programme (UNEP) report in 2009, China generates as much as 2.3 million tonnes of domestic e-waste yearly and the number is expected to increase to 3.5 million tonnes in 2011.<sup>19</sup> This means that developing countries who are already carrying the burden of industrial waste from manufacturing and imported e-waste from developed countries, now have their own domestic e-waste to think about.

It is estimated that each person generates 14 to 24 kilos of e-waste in Western Europe, totalling up to 9.1 million tonnes of e-waste across the European Union's (EU) 27 member states in 2005.<sup>20</sup> Despite the state-of-the-art recycling facilities; the effort in restricting the transboundary shipments of e-waste to developing countries; and the directives to make manufacturers take-back discarded electronics; there were reports from developing countries stating that they found e-waste from EU exported out for reuse, recycling or disposal purposes.<sup>21</sup>



Extracting precious metals from discarded electronics in China. Photo courtesy of Time Photos/Chien-min Chung

According to the research studies done for the Environment Agency for England and Wales, manufacturers would take back discarded electronics and sell them to brokers in Europe, who would then ship them as second-hand goods to developing countries or to informal recyclers for valuable metals extraction.<sup>22</sup> In a joint Asian inspection in 2007, Hong Kong customs seized 98 consignments of hazardous waste consisting 1000 tonnes of computer monitors and 2000 tonnes of batteries, mostly from US, Canada, Japan and EU countries.<sup>23</sup>

In the SwedWatch report 2009, it is evident that there are shortfall in EU harbours in regulating and checking shipments prior to their exportation. Most e-waste shipments departing from EU harbours that are labelled as 'donation' and 'reuse' purposes, cannot be verified on the spot. To know if the discarded electronics are functionable, the EU customs will have to physically inspect each and every one of the devices. With increasing trade flows these days, ports will have to keep up with processing speed. It is simply impossible to make a sound inspection with current resources. On top of this, customs have given priority to narcotics, alcohol and tobacco inspections.<sup>24</sup>

In addition to the amounting e-waste transboundary issues, collection of discarded electronics for recycling purposes is an entire problem on its own. According to Nokia research in 2008, merely 3%\* of the entire world's population recycle their old phones.<sup>25</sup> Most of them are stored at home and probably discarded later as normal waste which end up in landfills. It is estimated that 130 million mobile phones end up in landfills just in United States alone.<sup>26</sup>

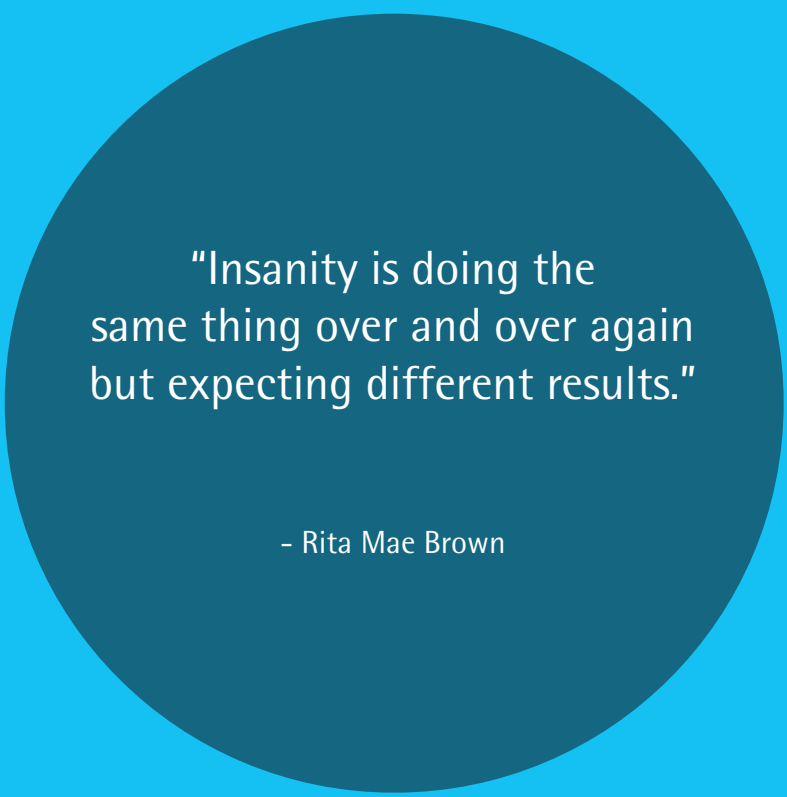
Driving recycling initiative alone will not be enough to combat our mobile phones over-consumption issues. In any case, it creates more

---

\*Disputable data: Nokia consumer's website claimed 9% of the people recycled their phones as of 2012, whereas their research conducted in 2008 said that there are 3% of the world's population recycled their phone. And because I couldn't find legitimate research documents to back-up their latest claim, I chose to use their 2008 research data, which in this case - 3%.

problems – creating health issues for those who import them. Current recycling initiative lacks proper legislation to control illegal exportation to developing countries who are incapable to recycle discarded electronics without harming the environment and themselves. The Basel Convention's inability to distinguish between recyclable and non-recyclable waste is one reason why hazardous e-waste end up being exported for recycling or reuse in developing countries.<sup>27</sup> Custom officers around the world lack resources to properly inspect shipments of e-waste. Driving recycling initiative will only provide an ethical liberation to consumers' conscience and in doing so, encourage them to replace their phones more often than necessary and thus generate more e-waste.<sup>28</sup>

By rapidly changing and throwing away mobile phones, we are wasting finite resources such as minerals and precious metals that are needed to manufacture these phones, and at the same time we are also creating e-waste problems. Recycling in developing countries is morally wrong. Until all countries have the capacity to locally manage e-waste, recycling is not a solution but a serious problem, and it is an imperative to look into finding a solution to stop generating more e-waste.



"Insanity is doing the  
same thing over and over again  
but expecting different results."

- Rita Mae Brown





## 4. CONSUMERS' DILEMMA

49 /  
Utopia /  
Part 2 /  
Consumers'  
dilemma

Frequent replacement of mobile phones and recycling were never mandated but they were nonetheless an encouraged practice in modern society. As the existing studies compiled in the first part of the thesis have shown; our reliance on mobile phone surged-on, with its astounding capabilities in aiding us to better connect at work, with friends and the world; and its ever improving technology and design, coupled with planned obsolescences from the manufacturers, have us replace our phones faster than ever.

To find out if the existing studies compiled in Part 1 of the thesis ring true, I conducted a preliminary survey in Helsinki 2011. I asked the general public, both males and females, between age 20 to 55, three questions:

1. Why did you replace your mobile phone?
2. Why have you not tried to repair or upgrade it?
3. How did you dispose the old phone?

These questions were asked in order to understand the general sentiments regarding mobile phones consumption and disposal among consumers. This will cast some light to the problems involved and help shape the questionnaire in the later part of the thesis (Part 3).

To the question "why did you replace your mobile phone?", most responded that their old mobile phones suffered malfunction of either hardware or software. In some cases, it was due to mishandling of the mobile phones on consumers part, such as "dropping the phone onto the floor" or "lost phone". However, in most cases, it was often due to new software updates provided by mobile phone manufacturers that are not compatible with the old hardware, thus resulting in slow operations or total incapacitation. Only a small number of the respondents replaced their perfectly functioning phones because they wanted the latest communication devices. Nonetheless, keeping up

with advance technology should also be looked into, as this is one of the manufacturers' selling point when they launched their new models. Interestingly, none of the respondents mentioned that the external design of new mobile phone models were the reason for their replacement. However, when purchasing a new mobile phone, the external design features such as lightweight, streamline and stylishness became considering factors.

When asked why have they not tried to send their mobile phones back for repair or upgrade services, most responded that they felt it made no sense to spend money in repairing, as the cost of repair was not a lot cheaper than buying new. In some cases, the repair price actually cost more than buying a new phone. In regards to upgrading the hardwares of the mobile phones, majority of the respondents did not think about it as they did not know hardware upgrades were possible. However, one respondent did try to send her old mobile phone back for upgrade of hardware, and was encouraged to buy a new mobile phone instead. She was informed that her three-year-old phone is "outdated" and they could not change the phone's processor to a new one. They advised her to either reinstall her mobile phone operating system to the original factory settings or to simply buy a new phone. The rest of the respondents just thought that it was inconvenient to have to wait for their malfunctioned mobile phones to be repaired, as it could take weeks to do so.

General sentiments regarding repair and upgrade of mobile phones are that they are time consuming and expensive with no guaranteed results. The advice given by mobile operators and manufacturers such as the above-mentioned case was insinuating towards replacement of old mobile phones. To reinstall an operating system to its original factory settings, means that all past upgrades made towards phone applications will be lost. This present another set of issues such as data lost due to applications and operating systems incompatibility, resulting

in slow operations or total incapacitation. Typically and nonetheless unfortunate, despite great efforts of trying to salvage a malfunctioned phone by reinstalling operating systems, this consumer will most likely end up where she started – having a three-year-old phone which does not function perfectly anymore.

As to how these respondents disposed their old mobile phones that are no longer in use, most answered they stored them at home. More often than not, consumers lacked the motivation to bring their old mobile phones back to manufacturers or operators for recycling. Despite respondents awareness of the Nokia recycling initiatives and other available venues that take back discarded electronics, they felt that it lacked incentives that they could benefit from. However, if there were to have a monetary reward for every old mobile phone brought back to recycling facilities, respondents said they would be more willing to participate.

The lack of motivation to recycle coincides with the data researched by Nokia in 2008, merely 3%\* of the world's populations sent their mobile phones for recycling, most people simply stored their unused, unwanted mobile phones at home.<sup>1</sup>

Though it is a consolation to learn that old mobile phones were not thrown away callously, we have no actual data or means to acquire more information as to what eventually happen to these old mobile phones, after they were stored away.

Despite a mere 3%\* of old mobile phones accountable for through recycling effort, more were found in landfills. It is estimated that 130 million mobile phones ended up in landfills just in United States

---

\*Disputable data: Nokia consumer's website claimed 9% of the people recycled their phones as of 2012, whereas their research conducted in 2008 said that there are 3% of the world's population recycled their phone. And because I couldn't find legitimate research documents to back-up their latest claim, I chose to use their 2008 research data, which in this case – 3%.

alone.<sup>2</sup> United States, who also lacks the infrastructure and facility to economically recycle discarded electronics, often exports discarded electronics to developing countries for disposal.<sup>3</sup> This not only shows that recycling campaign is a failed attempt, as most people are still not bringing their old mobile phones back for recycling or proper disposal; likewise it also shows that recycling is just another way of transferring e-waste problems to other countries.

Similarly, as a mobile phone user myself, I often encountered situations whereby, choosing to replace my old mobile phone seemed like a reasonable choice and a wise decision. Though there are batches of software upgrades provided by mobile phone manufacturers from time to time, users like myself can upgrade our phones with the latest operating systems with a click of a button; upgrades of hardwares such as motherboards or processors are however often discouraged. Since I am not technologically savvy when it comes to repair and changing parts of a mobile phone (like many other mobile phone users), I have to rely on manufacturers' diagnosis when it comes to mobile phone malfunctioning, which often resulted in much confusion and frustrations.

Much of the frustrations come from the lack in after-sales support such as repair and upgrades of parts to prolong usage of our existing mobile phones. For example, repair services provided by Nokia are sub-contracted approved third parties who operate under the umbrella brand name '*Nokia Care*'. Though Nokia's website provides information such as customer service phonenumber and online live chat service, both are operating on weekdays during office hours only (Monday to Friday from 9am to 5pm).<sup>4</sup> Their customer service offers little information pertaining to price and time needed for repair, as these information can only be obtained in the repair shops.

I tested the online live chat service provided by Nokia, and the support given were the regular "try rebooting your mobile phone" and "try reinstalling operating system". Since the support staff was not able to resolve my phone problems, I was directed to bring my phone to the '*Nokia Care*'. There, I was told that they needed time to diagnose the issues involved, and were unable to give me specific details such as time needed for repair and/or upgrade, or any ballpark figure on the price for the possible services that would be rendered. As a consumer, I had to make a choice on the spot. To take the risk of possibly paying high repair cost with no guarantee of issues solved or to take the easy way out, which in this case is to replace my malfunctioned phone with a brand new working one.

In a world where stores are packed with newly manufactured mobile phones with prices as low as thirty euros, readily available whenever our need to replace arise; it seems justifiable to want to choose the convenient route and replace an old malfunctioned phone with a new one. And without ample after-sales support from mobile phone manufacturers in time of phones breakdown, this route seems even more appealing than ever. In a society where communication and information are vital, it is unimaginable to function without mobile phones for more than a day. While waiting for malfunctioned mobile phones to be repaired and/or upgraded, most consumers felt "handicapped". In a technologically advanced era, it is unforgivable to suggest that a device such as mobile phone is unrepairable and not upgradable; and buying new and recycling old is the only viable solution.

## 5. LOOKING BACK, MOVING FORWARD

A quick online search on waste related issues, and one will be able to find an enormous list of websites providing ready information on how to manage waste issues through recycling. Which in this case is to process used products into materials that can be reused so as to reduce consumption of raw materials.

It will take a little more of one's initiative to probe the search further before one is able to find an alternative solution, which is waste reduction and material conservation – Reduce, Reuse, Recycle (Three 'R's). The defining difference between waste management and waste reduction is that the former focuses on processing waste after it has been created, emphasising primarily on recycling; as oppose to the latter which focuses on prevention of waste generation through reduction and reusing of products before they are disposed.<sup>1</sup>

The trichotomy of Three 'R's is a waste reduction and material conservation strategy (Figure 1), started sometime after World War II, when shortages of materials called for a systemic intervention in cutting back consumption and salvaging all materials possible.<sup>2</sup> It comprises of a three steps method, with Reduce leading the hierarchy of the three steps, followed by Reuse and lastly Recycle. Reduce is the most effective method in the waste reduction and material conservation strategy, hence it is also the most important first step of the trichotomy. Recycle being in the last of the trichotomy means that this step shall only be implemented after the other two steps have been exhausted. Here is how the trichotomy can be applied in order to successfully reduce waste and conserve resources<sup>3</sup>:

- **Reduce:** First try to reduce consumption and waste generated by producing less, buying less and hence throwing away less. We can do this by repairing old or broken products instead of buying new. Reduction in consumption can also mean using less resources in

the process of manufacturing a product, for instance, less energy consumption during production stage. And/or simply using less materials when producing products, for example, design products that require less usage of materials.

- **Reuse:** Secondly, try to reuse a product in its original form recurrently over an extended period of time. For example, to find new usage for an empty food jar, such as storage for leftover food. To trade, sell or give away products that no longer serve you any purpose but may still be useful for others. This prolongs the lifespan of a product and so it need not end up in disposal bin sooner than it should be.
- **Recycle:** Lastly, when the above two steps have been exhausted, to recycle by extracting valuable materials from used products and process them into materials that can be used for the manufacturing of new products later.

The Three 'R's concept is a pragmatic approach towards waste related issues. If we can reduce our needs to frequently produce, purchase and discard, we will automatically produce less waste and require less raw materials for future manufacturing of new products. And if we are successful in trying to lessen the generation of waste, there will be little need to manage our waste issues through recycling. Recycling was never meant to be the only solution to the world's waste problems. To successfully reduce our waste issues, we have to implement all three steps of the Three 'R's strategy.

Economic recovery from post World War II saw the need for global economic growth, which inherently lies in frequent purchase of products. This superseded the concerns for the environment. There is no difference in the mobile phone industries. Making profits are important for business

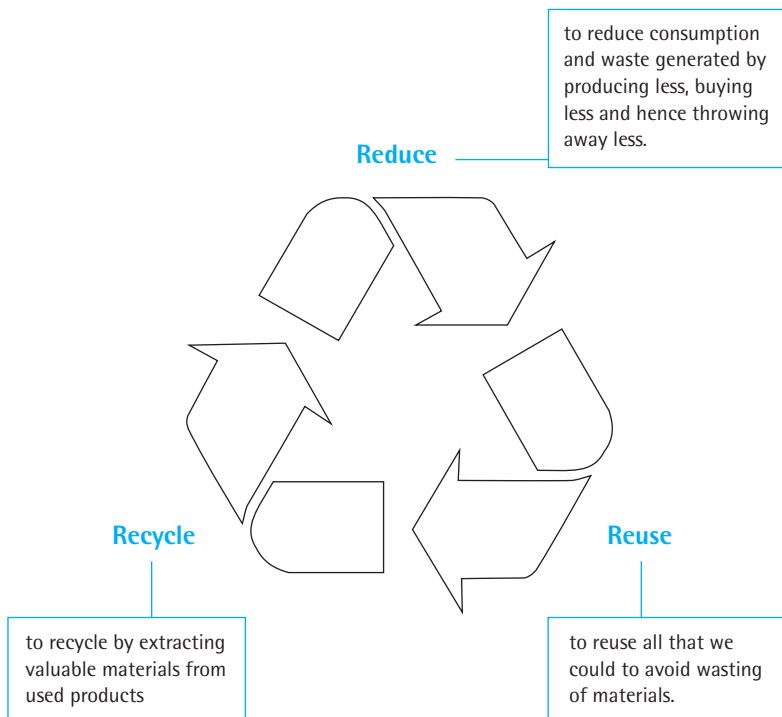


Figure 1: Three 'R's



growth. It is apparent as to why mobile phone manufacturers are more inclined to drive recycling initiatives. Reduction in consumption is bad for business. The faster the consumers replace their mobile phones, the more mobile phone manufacturers will profit from the sales made. Recycling is more compatible with their business growth, because recycling allows more consumption and provides an ethical liberation of the consumers' conscience, allowing consumers to think that their consumption and disposal habits are ecologically sound.<sup>4</sup>

Nokia, the leading mobile phone manufacturer for the past 20 years, recently launched a few ecologically friendly phones; boasting 100% recyclable materials used in their new mobile phones.<sup>5</sup> Though it is applaudable for their interest in the environment, and no doubt a remarkable feat to be leading in the innovation forefront of green design; it is nonetheless solving e-waste issues superficially.

Despite having a comprehensive recycling programme which provides 6000 collection points in 100 countries; Nokia failed to score maximum points in the Greenpeace's *'Guide to Greener Electronics research 2012'*. This is due to the small amount of mobile phones that were collected at recycling point.<sup>6</sup> Their new eco phone - Nokia 700, only managed to use 11% recycled plastics and 18% recycled metal, the rest comes from raw materials.<sup>7</sup> Nokia's inability to increase its products' lifespan through hardware upgrades, cost them some points too. Greenpeace's research also showed that Nokia are still using hazardous substances in their mobile phones.<sup>8</sup> Though Nokia did do better than 2011 in view of its sustainable operations, and is better than any other mobile phone manufacturers with regards to sustainability efforts; it is nonetheless a far cry from being associated as a green product/brand.

Putting sustainable efforts primarily on recycling is the reason why we still have prevailing e-waste issues today. Recycling involves the process of extracting materials from discarded mobile phones, this exhausts



The Great Recycle Bin. Photo courtesy of Honest Tea.

energy in the process. Moreover, we have to take into consideration of the logistics involved in transporting mobile phones from recycling collection points to the recycling facilities.<sup>9</sup> We cannot assume that recycling requires less raw materials, less energy consumption and generates lower emissions into the environment; much more than we can assume that all consumers will conscientiously bring their old mobile phones back to be recycled later.

Mass media often misconstrued that we can recycle ourselves out of our dire situation in regards to e-waste problems. The common belief and understanding of recycling is as reflected in Wikipedia's definition:

Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse, Recycle" waste hierarchy.<sup>10</sup>

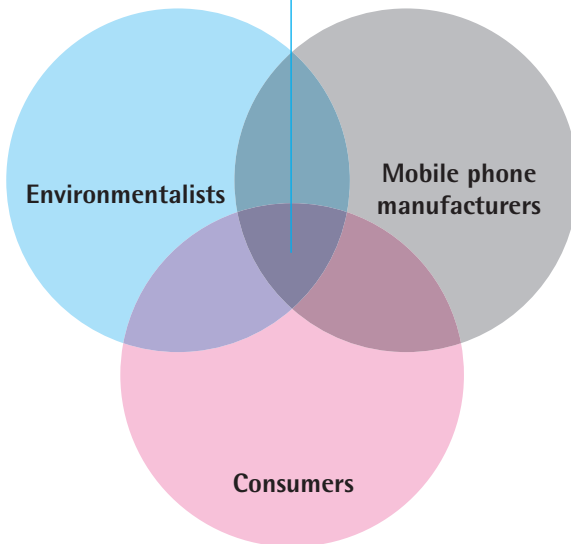
Though Wikipedia is often chided as an unreliable source of information, it is undeniably a powerful source in acquiring and sharing of information in the mainstream media, especially when its information are collaboratively contributed by volunteers – everyday people. In other words, it represents humans' collective knowledge on a particular subject – the common understanding of the common people. It is no wonder why most of us will have the misconception that when we send our discarded products back for recycling, we have done our part in saving the planet.

System is a complex whole which depends on many small parts. We cannot change one aspect and expect that the result will effect in the entire system. To discuss sustainability issue concerning e-waste using recycling as a mean to an end, is doing exactly that. System needs to be studied as a whole and changes have to be done to the entire system. Sustainability effort in technological innovations are applaudable but it cannot stop us from filling our landfills with our malfunctioned, unrepairable and not upgradable products.

Environmentalists are against consumerism, pollution and other activities that were harmful to the natural world. However, they failed to recognise that this noble idea is working against current economic model which needs frequent consumption to survive.

A solution that benefits all stakeholders.

Business' bottom line has always been about profits. To do so, they have to sell. The more they sell, the more they profit. And that requires consumers to buy new more frequently. Hence causing unnecessary waste by throwing old away.



Consumers want the latest communication technology and are under the disillusion that they have contributed their part by recycling their unwanted products religiously.

Figure 2: Stakeholders current stance

Most businesses are fueled by conventional capitalism – product manufacturing and replacements. This may support the current economic system which thrives on conventional capitalism. For mobile phone manufacturers who rely solely on this system, the idea of responsible consumers who consumed within their needs and not more, must be an intimidating thought to them. However, the adequacy of conventional capitalism must be questioned: how long can mobile phone business which is driven by stimulated consumers' demands last? Especially when our resources are not infinite and our landfills cannot cope with the speed of mobile phones being thrown away.

Consumers are taught that having the latest communication device with advance technology is vital. In a highly competitive industry, mobile phone manufacturers have no qualm making mobile phones' price affordable, so replacing old with new becomes attractive towards consumers. The ever improving design and technology features on new mobile phones, have consumers lusting for new replacements.<sup>11</sup>

Consumers are often encouraged to replace their old mobile phones due to the lack of after-sales services for repair or refurbishment of mobile phones when the need arises.<sup>12</sup> They are informed that by sending their old phones back for recycling are ample efforts in combating the mounting issues on e-waste.

Mobile phone manufacturers rather spend money in research and development in innovating a 100% recyclable phone than to provide repair and refurbish services such as hardware/software upgrades to their customers. Meanwhile people who care about the environment are urging consumers to cut back on their consumptions; failing to recognise that this noble idea is working against current economic system which needs frequent consumption to survive.

The disparity lies in the lack of common interest among the stakeholders in this economic system. Consumers want the latest technology. Mobile phone manufacturers want profits. Our environment cannot take more e-waste. If we were to look at the issues in totality and study these problems simultaneously, we will find that there is a common baseline where all three stakeholders can benefit – a utopian scenario where we can achieve a healthy consumption lifecycle, slow down e-waste generation; consumers will always have the latest phone technology and mobile phone manufacturers continue to make profits (Figure 2).

To slow down e-waste generation, it is pivotal that consumers reduce the frequency of mobile phone replacements significantly, which in turn will effect mobile phone manufacturers' profits. And since sales and profits are the driving force for businesses, the fundamental question we have to ask is: how can mobile phone manufacturers continue to make profits if phone replacements were to slow down considerably? Afterall, the purpose of this research is to find a sustainable solution to reduced mobile phone consumption without hurting the mobile phone business.

From the preliminary survey conducted, the common scenario of mobile phone replacement among consumers is charted out for easy understanding (Figure 3). This chart allows me to demonstrate the current structure of the mobile phones consumption lifecycle, ascertain where the issue lies in terms of phone replacements and e-waste generation; and determine the primary revenue streams for mobile phone manufacturers.

With mobile phone technologies advancing ever so quickly, we saw incremental improvements on mobile phones almost every year. This means that to own the latest piece of communication technology, consumers will have to replace their old phones promptly. This is more evident in the current mobile phone consumption lifecycle (Figure 3), especially when mobile phone manufacturers do not provide after-sales

support to upgrade hardwares such as faster processors and/or upgrade of new operating softwares, so to prolong usage of mobile phones. In short, current mobile phones are designed and produced in anticipation of early replacements and eventual recycling.

On top of that, we have the occasional mobile phones malfunctioning due to consumers mishandling or other non-human contributing factors. Consumers find repair service a time consuming and an expensive affair, most consumers opt to replace old with new, when facing breakdown of mobile phones.

Consumers presumably replace their old mobile phones every 2 to 4 years, due to phones malfunctioning or wanting/needing a new phone with advance technology.<sup>13</sup> This consumption lifecycle requires and encourages frequent mobile phone replacement in order for consumers to have the latest phone technology or fully functioning communication devices. This structure no doubt encourages recycling, it does not prolong lifespan of mobile phones, hence it is deemed unsustainable and most wasteful in resources, more so when most old phones are kept at home, waiting to be trashed one day.

Mobile phone manufacturers profit mostly in sales of mobile phones and possibly from recycling if they manage to extract precious minerals from discarded phones, and/or sell them as second hand phones to third world countries. As one can see from the chart, if we were to reduce their primary revenue stream by encouraging consumers to prolong product lifespan and slow down mobile phone replacement, this reduction in consumption will significantly effect mobile phone manufacturers' profits.

The challenge lies in, what other revenue streams can we create to replace the profit from sales?

Current Consumption lifecycle

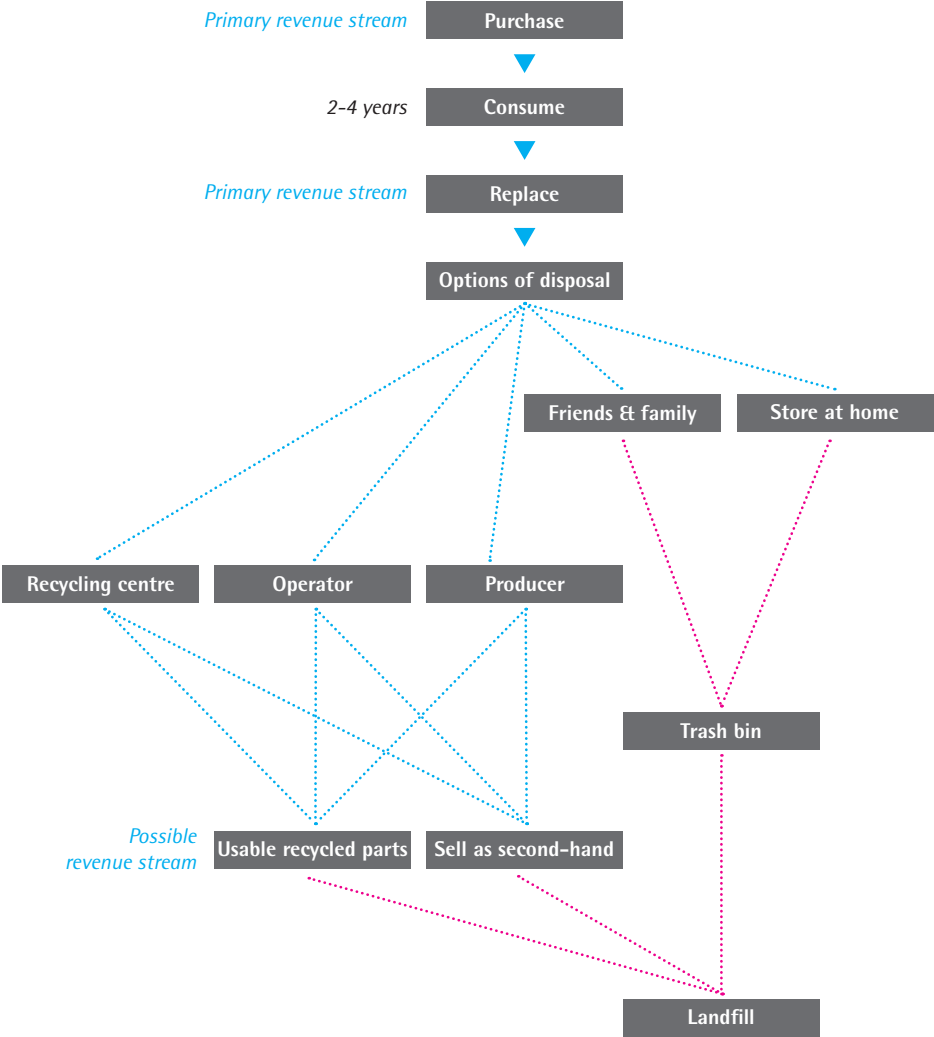


Figure 3: Mobile phone designed and produced to be recycled.



Without reinventing the wheel, my proposal is to introduce the Three 'R's strategy in the mobile phone consumption lifecycle (Figure 4). With these three steps added into the structure, we will be able to prolong the lifespan of mobile phones through constant repair and/or upgrade in software and hardware when necessary.

Adhering to the Three 'R's strategy, consumers will be able to **reduce** mobile phones consumption by repairing broken phones or upgrade old hardwares such as processors or installing new softwares that work well with the hardwares. This means that consumers get to **reuse** their old but newly improved devices for an extended period of time, thus increasing replacement time. And lastly, when consumers have repaired/ upgraded all that they can and want or need new phones, they can then return their old phones back to manufacturers for **recycling** while they buy new mobile phones. With reduction in mobile phone consumption, e-waste generation will slow down significantly.

The proposed structure (Figure 4) not only reduces consumption of mobile phones and e-waste generation problems, it also enhances consumers/manufacturers relationship over a period of time, with higher chance of consumers bringing their old mobile phones back for recycling, instead of storing them at home.

Moreover, mobile phone manufacturers can now charge a service fee every time a consumer request for repair and/or upgrades. And if consumers were to be encouraged to send their phones for servicing more often, manufacturers will be able to profit more from services rendered. This is not only an alternative revenue stream to replace their current source, this is an additional revenue stream which manufacturers will definitely profit from.

With this structure, consumers can keep abreast of what the latest mobile phone technology have to offer, manufacturers can profit

# Proposed Consumption lifecycle

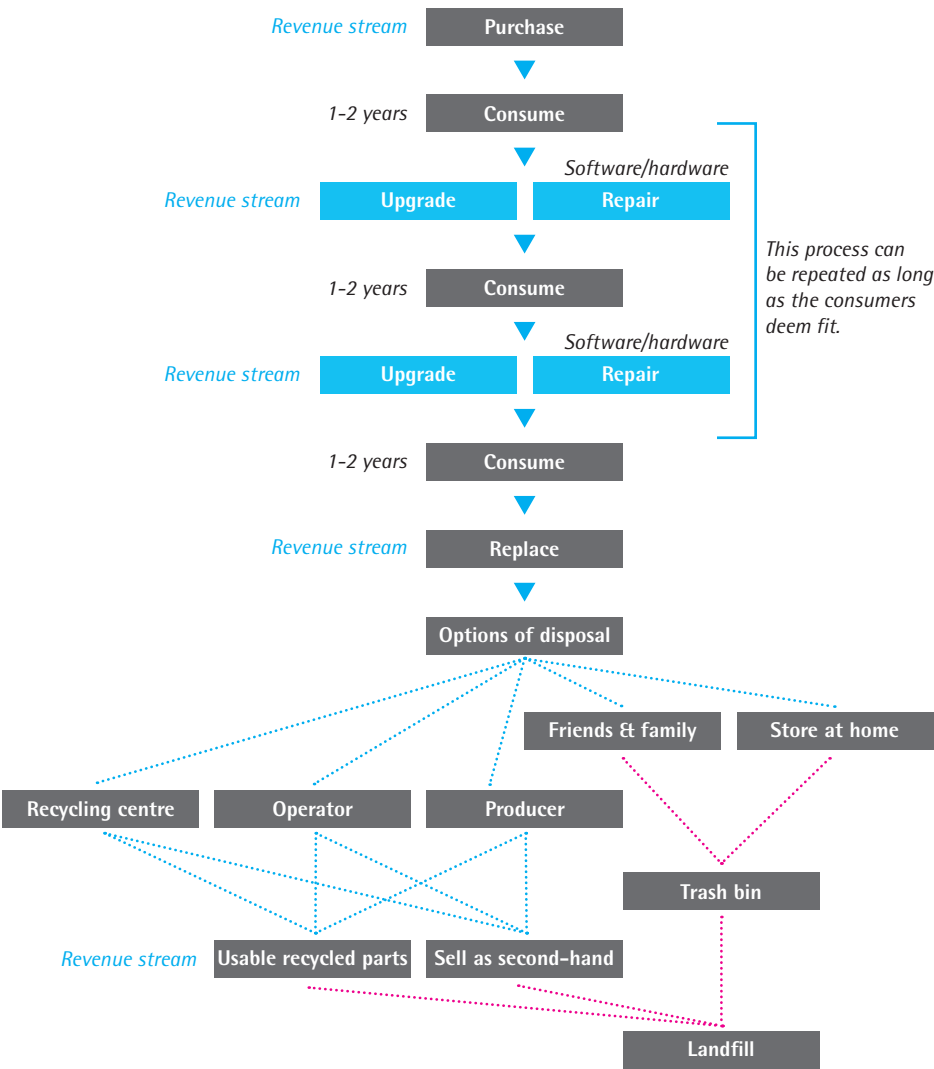


Figure 4: Mobile phone designed and produced to be repaired and refurbished using the principles of Three'R's strategy

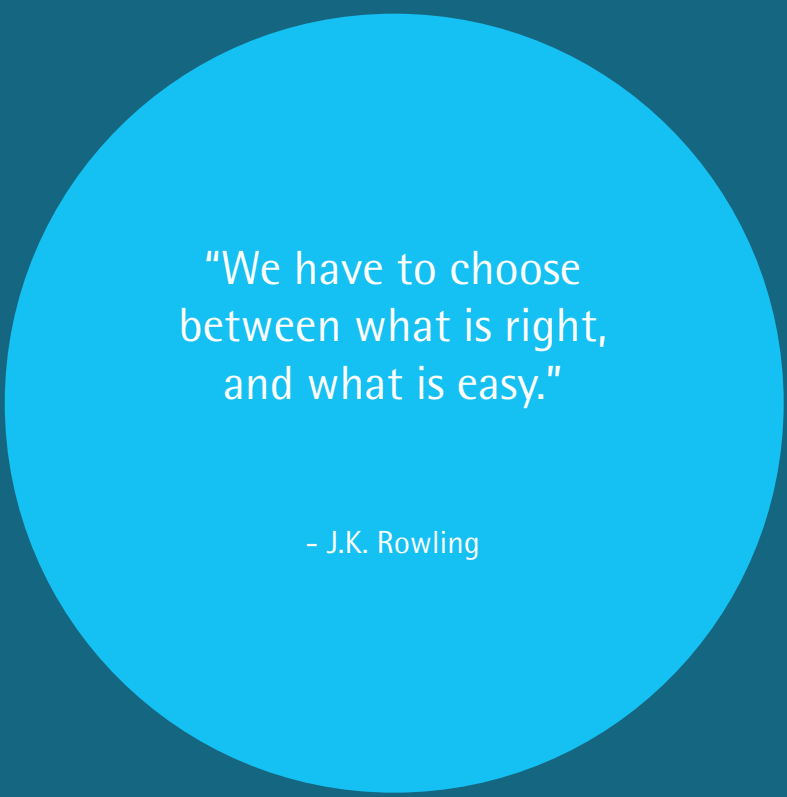
from additional revenue stream through services provided and the environment will have less e-waste issues to manage. (well, at least from the mobile phone sector)

The introduction of Three 'R's strategy in the mobile phone consumption lifecycle is both pragmatic and logical with regards to eradicating or slowing down e-waste generation, moreover, it make 'money' sense to the manufacturers. Having a slower replacement cycle not only benefits our planet, it also benefits the manufacturers in terms of getting less pressure from environmental groups who advocate responsible product end-of-life disassembling and treatment as solely the manufacturers' responsibility. Not to mention, it is also costly to build recycling infrastructures to support our rampant replacement of mobile phones.

The following part of this research will be used to test out the hypothesis of the proposed structure. Afterall, an idea is only as good as its execution. We need to find out if consumers are in favour of this new consumption lifecycle structure.



Tonnes of e-waste exported to China for disposal purpose. Photo courtesy of Time Photos/Chien-min Chung



"We have to choose  
between what is right,  
and what is easy."

- J.K. Rowling



## 6. LOOK DEEPER (THE QUESTIONNAIRE)

The purpose of this research is to find a sustainable solution to reduced mobile phone consumption without hurting the mobile phone business. A solution whereby consumers will continue to own the latest piece of technology, mobile phone manufacturers continue to make profits and yet not having a negative impact on our environment by producing huge amount of e-waste. To achieve this, research questions in this questionnaire are identified and drafted in accordance to their importance in aiding this research in three separate focuses as elaborated in the following paragraphs.

### *The three focuses*

Having identified and established that the hypothesis of introducing the Three 'R's strategy into the consumption lifecycle of mobile phones, may have a significant impact in; providing mobile phone manufacturers extra and/or alternative revenue streams; allowing consumers to enjoy the latest mobile phone technology; and reducing mobile phone e-waste generation. The main focus of this questionnaire will be to find out if the concept of after-sales repair and refurbishment services will be well-received by consumers.

And to further deduce that after-sales repair and refurbishment services will be a successful solution which benefits all stakeholders, my secondary focus is to also seek out what are the main drivers for rampant mobile phone replacement and the lack of motivation in repairs and refurbishments of old mobile phones among consumers in the current mobile phones consumption lifecycle. Reason for this secondary focus is to validate the background studies presented in Part 1 of this research. This secondary focus is also to draw deeper insight into understanding the intricate sentiments towards mobile phone consumers' rampant consumption habit. Only having gain this crucial insight can I confidently conclude that the Three 'R's strategy will be a befitting solution to curtail our mobile phone consumption habits.

The third focus of this questionnaire is to gather background information of the respondents, to get hold of the demographics of the respondents who participate in this survey. This data may come in handy in the later part of this research when I analyse the results collected, in the event where there are possible correlations between surveyed respondents' mobile phones consumption habits and their personal information pertaining to age, occupation, income, types of phones used etc.

### *The respondents*

The questionnaire comprises of 28 research questions, mostly multiple choice questions, centered around the three focuses described above. The survey will be conducted online targeting at a diverse group of respondents from Finland and Singapore.

Drawing from past experience, respondents are more likely to participate in surveys that do not take up too much of their time. Questions in this survey will be specifically crafted leading towards multiple choice answers, allowing participants to quickly response to the questions. And since this survey will be conducted online, it is entirely up to the respondents' discretion to partake or not. The multiple choice questionnaire is a strategy to get more response for this online survey. The multiple choice answers that will be provided in this survey will be determined based on the background research conducted and presented in Part 1 of the thesis.

The primary reason for not focusing on a more streamlined group of respondents, is for the fact that mobile phone consumers is constituted of a diverse group of users which implicated collective issues involving all mobile phone consumers.

As for the choice of countries chosen to partake in this survey, other than the obvious reason that I have been living in both countries and thus have made some observations and assumptions on their consumers'



consumption habits, the main reason would be that both countries have open economies whom are accessible to international trade and investments<sup>1</sup>, and are similar in their population size<sup>2</sup>, disposable income<sup>3</sup> and Human Development Index (HDI)<sup>4</sup>. HDI is a statistical indicator measuring life expectancy at birth, education and standard of living of a country with strong correlation in signifying if the country's economy is robust and healthy.<sup>5</sup> Whereas, disposable income is an indicator of available financial means of the people for consumption spendings.<sup>6</sup>

In addition to the countries' similarities, there are disparities which can present an interesting juxtaposition in this research. Despite having similar disposable income, the replacement cycles are vastly different. Through observations, most Singaporeans replace their mobile phones every two years, while on the contrary, most Finnish make a replacement every three to four years.

Moreover, both countries' mobile phone operators offer different mobile phone contracts and deals notwithstanding the fact that these two countries have similar economic and technological infrastructure. Singapore operators offer subsidies for new mobile phone purchases when consumers renew or sign a new mobile phone contract. Finnish mobile phone operators do not offer any subsidies for new mobile phone purchases in conjunction with renewal and/or signing of new mobile phone contract. By comparing data collected from these two countries, I hope to discover what might be a significant systemic factor in driving rampant mobile phone replacement.

### *The methods*

Due to the exploratory nature of this research, which is seeking new thinking and/or approach within an existing and established area of studies, and in addition to a certain amount of speculation in regards to solution finding and application, I have decided to combine both

---

# Mobile phones consumption and disposal habits

---

This survey is integral to my master thesis in an attempt to understand mobile phones consumption and disposal in Finland and Singapore. The result of this survey will only be published in my thesis for academic purposes and not for commercial gains.

\* Required

---

## 1) Country of residence? \*

- ☐ Finland
- ☐ Singapore

Continue »

---

Powered by [Google Docs](#)

[Report Abuse](#) - [Terms of Service](#) - [Additional Terms](#)

The online survey  
<http://www.shahou.net/survey/>

qualitative and quantitative approaches in the formation of research questions, respondents selection and results analysis.

The aim of this survey is to understand the semi-predictable behaviour of the mobile phone consumers in multiple contexts and conditions, which is why a hybrid of both methods will serve this purpose well.<sup>7</sup> Moreover, the hybrid of quantitative and qualitative methods will allow me to combine the strength of both methods in acquiring data needed to support my hypothesis.

It is with these background knowledge from existing literatures, preliminary observations and assumptions made that I concluded 28 research questions in this questionnaire. In the following pages, the three focuses and their respective questions will be elaborated. List of questions can be found in Appendix V.

### *The research questions*

#### **Main focus: Consumers' interest in the proposed repair and refurbishment services**

##### *Questions 24 - 26*

This portion of the survey is dedicated to find out respondents' interest level towards the proposed concept of mobile phone manufacturers and/or operators offering after-sales services such as repair and refurbishment of old and/or malfunction mobile phones. Question 24 allows the respondents to freely express their opinions on this issue. Questions 25 and 26 are tasked to find out the price range and time frame that are deemed reasonable for repair and refurbishment services amongst the respondents. This information is crucial in determining the feasibility of the proposed concept. In the event that consumers are expecting a fast repair and refurbishment at low cost, it will be a considering factor for mobile phone manufacturers and operators to meet this expectation should they decide to cater such services.

## **Secondary focus (a): Drivers for mobile phones replacement**

*Questions 6, 7 - 12, 27 - 28*

The secondary focus are split into two sub categories. Portion (a) is tasked to find out the driving factors of mobile phone replacements. Portion (b) is tasked to find out the driving factors for attempt and no attempt in repairing old mobile phones.

Driving factors for mobile phone replacement are identified as the following; functionality, usability, aesthetics, technology, malfunction and subsidies, presented in questions 7 - 12. This is to seek out what is deemed as the biggest driver in mobile phone replacement among the respondents. This is an important knowledge in defining and refining the type of after-sales services needed for the proposed concept of mobile phone manufacturers and/or operators offering services such as repair and refurbishment of old and/or malfunction mobile phones.

Question 6 seeks to find out the frequency of mobile phone replacement made by the respondents. Questions 27 and 28 are to find out the length of contract respondents have with their mobile phone operators and the subsidies offered by their mobile operators for new mobile phone purchases in conjunction with renewal and/or acquiring of new mobile contracts. The plan is to combine the results collected from these three questions in hope to discover and therefore conclude that rampant consumption and frequent replacement of mobile phones are systemic problems, encouraged and cultivated by mobile phone manufacturers and operators, through subsidies given for new mobile phone purchases during the course of mobile phone contracts renewal or acquiring of new contracts. The data collected will also justify and validate the assumptions made in the early part of this research that subsidy for new phone purchase is a contributing factor in frequent replacement of mobile phones.

## **Secondary focus (b): Motivators and lack of motivators in repair and refurbishment**

### *Questions 15 - 23*

Questions 15 - 17 aimed to filter and separate respondents who have made attempts in trying to repair and refurbish their mobile phones from those who have not made the attempt. These questions are also tasked to find out what motivates respondents to repair and their approaches. This knowledge will be important when I analyse and compare results later, so as to understand the conditions present when respondents did try to repair their phones, in hope to emulate and perhaps recreate the right conditions to encourage those who are not motivated in repairing their phones.

Questions 18 -23 aimed to find out the deterrents in making no attempt in mobile phones repair and refurbishment. Six deterrents are identified, namely, lack of knowledge to do it themselves, no services provided, the price issue, the inconvenience of repair, phones that are beyond repair and the ease to simply buy new phones. Results from these questions will help determine the biggest reason for respondents' lack of motivation in repair and refurbishment of their mobile phones. Results collected will be compared to the results of respondents who did try to repair their phones, in hope to eliminate the deterrents as much as possible, so as to encourage consumers in sending their mobile phones for repair and refurbishments.

## **Third focus: Generic information**

### *Questions 1 - 5, 13 - 14*

The section gathers background information of the respondents' country of residence, age, occupation, income, type of mobile phones used, their method of disposal and their concern about e-waste generations.

Sample of visualisation used

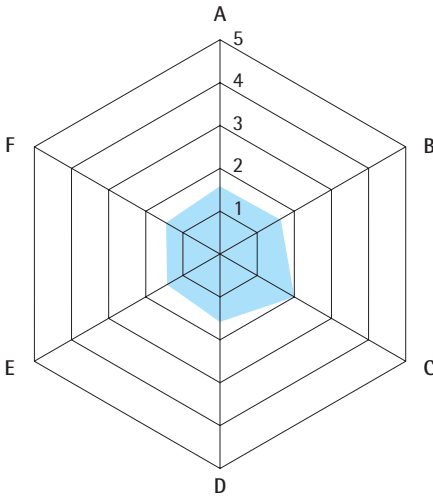


Figure 1: Sample of spider web chart

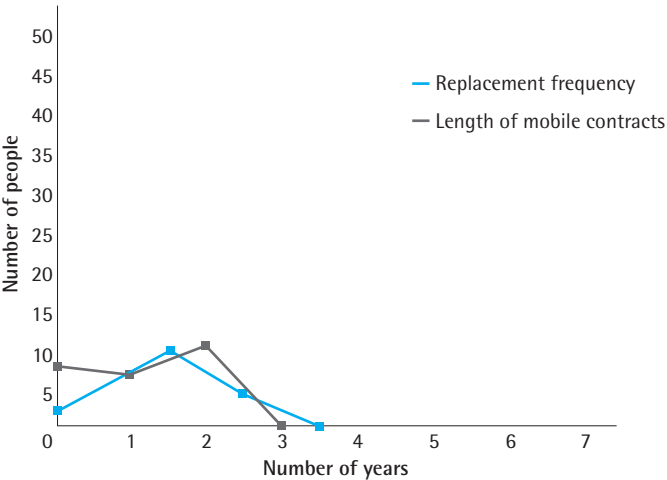


Figure 2: Sample of graph

For ease of visualising and better understanding of the data collected from the online survey, the results will be presented in graphs and spider web charts in the following chapter (Figure 1 and 2). In addition, data will be analysed to gain crucial insights to our mobile phones consumption habits.

## 7. INSIGHTS (RESULTS AND ANALYSIS)

Through the online survey conducted, 55 and 56 responses from Singapore and Finland were collected respectively. Due to the small number of respondents who responded to this survey, the results presented here are therefore not a reflection of the entire population from both countries, but rather an indicative representation of the current mobile phone consumption situation.

The small number of participation in this survey also means that presenting results in percentages will be subjected to big margin of errors and will therefore be extremely inaccurate. Hence, the findings will be presented in actual figures collected instead.

Findings and analysis from both countries will be presented in following pages, starting with the third focus, moving on to secondary focus and eventually the main focus.

### **Third focus: Generic information**

#### *Age group*

Majority of the respondents from both countries who take part of the survey are from age 26 to 35. Here's the breakdown:

#### SINGAPORE

- a) 23 out of 55 Singapore's respondents belong to age group 26 to 35.
- b) 18 of the respondents are from age 36 to 45.
- c) 7 are between 17 to 25 years of age.
- d) 5 are from age 46 to 60.
- e) 2 are age 61 and above.
- f) none are below 16 years of age.



#### FINLAND

- a) 36 out of 56 Finland's respondents belong to age group 26 to 35.
- b) 7 of the respondents are from age 36 to 45.
- c) 5 are between 17 to 25 years of age.
- d) 5 are from age 46 to 60.
- e) 3 are age 61 and above.
- f) none are below 16 years of age.

#### *Income group*

Most of the respondents from the two countries are earning between 20 to 50 thousands annually:

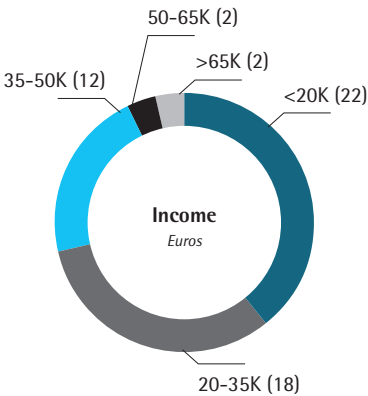
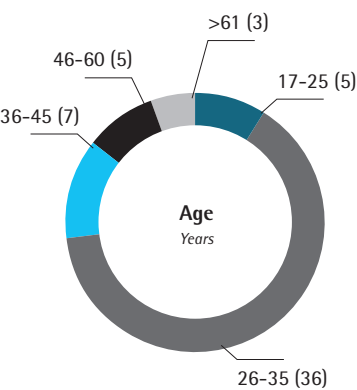
#### SINGAPORE

- a) 20 out of 55 Singapore's respondents earn between 35 to 50 thousands Singapore dollars annually.
- b) 11 of the respondents earn less than 20 thousands.
- c) 8 earn between 20 to 35 thousands.
- d) 8 earn between 50 to 65 thousands.
- e) 8 earn more than 65 thousands per year.

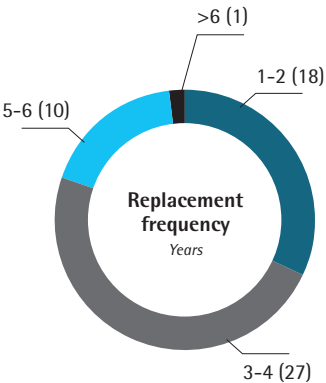
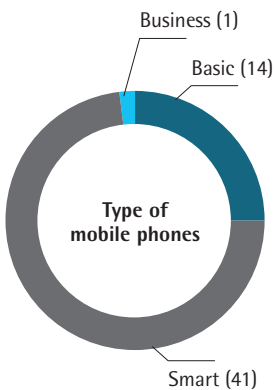
#### FINLAND

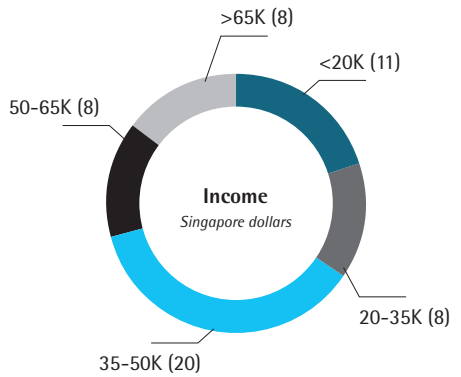
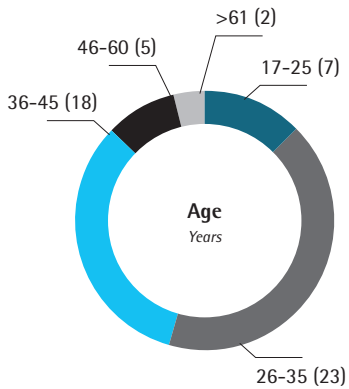
- a) 22 out of 56 Finland's respondents earn less than 20 thousands Euros annually.
- b) 18 of the respondents earn between 20 to 35 thousands.
- c) 12 earn between 35 to 50 thousands.
- d) 2 earn between 50 to 65 thousands.
- e) 2 earn more than 65 thousands per year.

Generic information at a glance

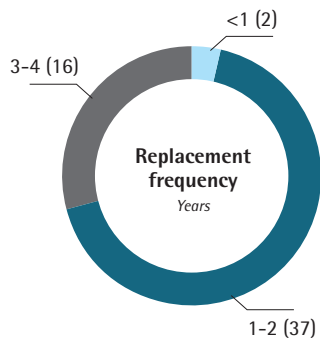
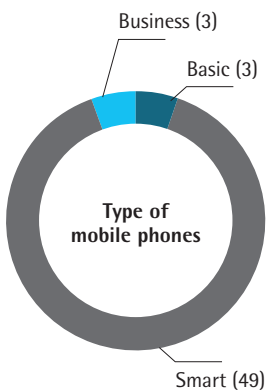


Finland: 56 respondents in total





Singapore: 55 respondents in total



### *Types of phone in use*

Despite differences in the income level of the majority of the respondents in Finland and Singapore, most respondents are currently using smart phones:

#### SINGAPORE

- a) 49 out of 55 Singapore's respondents are currently using smart phones.
- b) 3 are using basic phones.
- c) 3 are using business phones.

#### FINLAND

- a) 41 out of 56 Finland's respondents are currently using smart phones.
- b) 14 are using basic phones.
- c) 1 is using business phones.

### *Methods of disposal*

Regarding disposal of unused mobile phones, both countries clearly showed differences in preferred method of disposal.

Singapore's respondents prefer to use their old mobile phones to trade for new phones. This means that respondents brought their old mobile phones to operators and/or manufacturers when they want to purchase new mobile phones. The value of their old mobile phones were used to offset the price of new mobile phones they purchased.

Whereas Finland's respondents prefer to keep their old mobile phones at home. Both countries showed little efforts in sending their old mobile phones to recycling facilities.

## SINGAPORE

### (Figure 1)

- a) 20 out of 55 Singapore's respondents would trade-in.
- b) 17 stored their old phones at home.
- c) 15 passed their old phones to friends and families.
- d) 2 had tried to sell their old phones on eBay or other similar portals.
- e) 1 had tried to send his/her old phone to recycling centre.
- f) none had thrown away their phones into common trash bin.

## FINLAND

### (Figure 2)

- a) 39 out of 56 Finland's respondents stored their old phones at home.
- b) 10 passed their old phones to friends and families.
- c) 3 had thrown their old phones into common trash bin.
- d) 2 had tried to trade-in their old phones.
- e) 2 had tried to send their old phones to recycling centre.
- f) none had tried to sell their old phones on eBay or similar portals.

### *Concerns for environment*

Both countries showed little concerns with regards to how their old mobile phones were being disposed. More than half the participating respondents from both countries answered 'no' to the survey question.

32 out of 55 Singapore's respondents are not concern about the repercussion in their methods of disposal. 29 out of 56 Finland's respondents are not too concern either.

Method of disposal

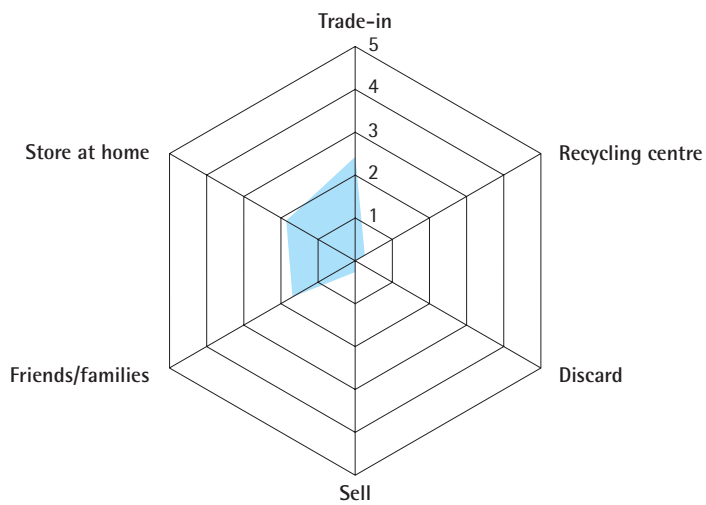


Figure 1: Singapore data

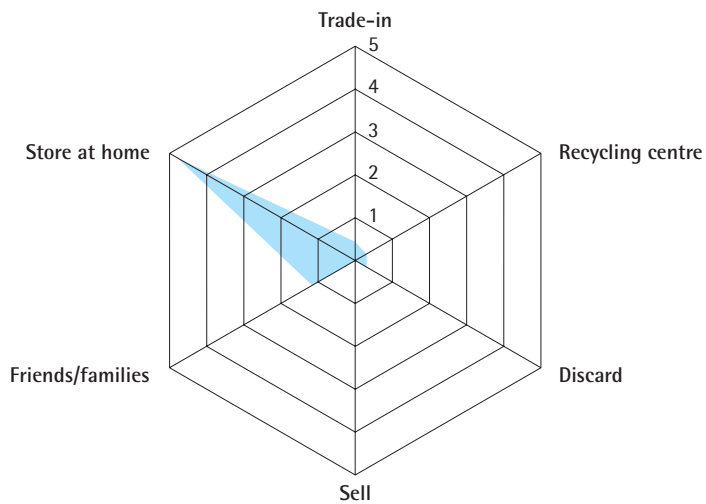


Figure 2: Finland data

## Secondary focus (a): Drivers for mobile phones replacement

### *Replacement frequency*

From the survey results collected, Singapore's respondents are more likely to replace their mobile phones within a 2 years time frame as compared to Finland's respondents. Majority of the Singapore's respondents have replaced their old mobile phones with new mobile phones every 1 to 2 years time. None uses their phones for more than 4 years.

Most Finland's respondents replaced their mobile phones every 3 to 4 years. About a third of them replaced their mobile phones every 1 to 2 years. None replaces their phones in less than 12 months.

#### SINGAPORE

- a) 37 out of 55 Singapore's respondents replaced their phones every 1 to 2 years.
- b) 16 of the respondents replaced their phones every 3 to 4 years.
- c) 2 had replaced their phones in less than 12 months time.
- d) none uses their phones for beyond 4 years.

#### FINLAND

- a) 27 out of 56 Finland's respondents replaced their phone every 3 to 4 years.
- b) 18 of the respondents replaced their phone every 1 to 2 years.
- c) 10 replaced their phone every 5 to 6 years.
- d) 1 respondent replaced his/her phone every 6 years and beyond.
- e) none replaces their phone in less than 12 months.

### *Length of mobile phone contracts and subsidies*

Survey showed that most Singapore's respondents have 2 years contract with their mobile operators, only a handful have either a 1 year contract or are contract free. None of the respondents have a 3 years contract. Singapore's mobile operators commonly offer 1 to 2 years contract and not 3 years, which explains why none of the respondents have a 3 years contract with their mobile operator.

Larger part of the Singapore's respondents also admitted that their mobile phone operators offered subsidies to new mobile phone purchases when they renewed or acquired new contracts.

Most of the Finland's respondents do not have a mobile contract with their mobile phone operators. A few of the individuals have either a 1 year or 2 years contract with their mobile operators and none of the respondents have a 3 years contract. Finland's mobile operators often offer contracts up to 2 years, which explains why none of the respondents have a 3 years contract with their mobile operator.

Quite a significant number of the Finland's respondents said that their mobile phone operators offered subsidies to new mobile phone purchases when they renewed or signed new contracts. Interestingly, none of the operators in Finland, to the best of my knowledge, have ever offered or are currently offering subsidies for new mobile phone purchases in conjunction to contract renewal and/or new contract. Either the respondents have been misled by operators into believing they are getting subsidies from new phones purchases or they have seriously misunderstood the survey question.



## SINGAPORE

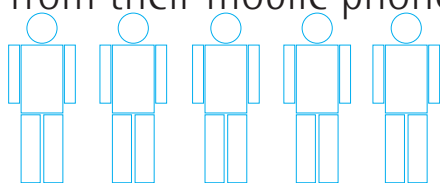
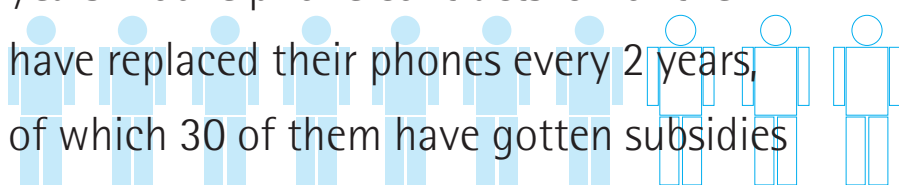
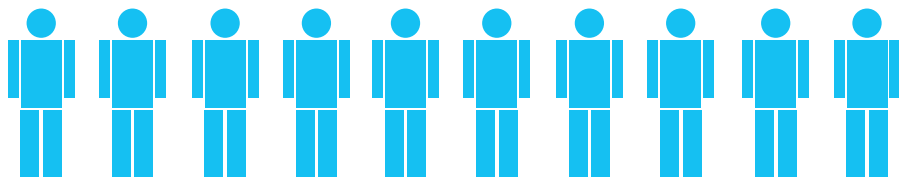
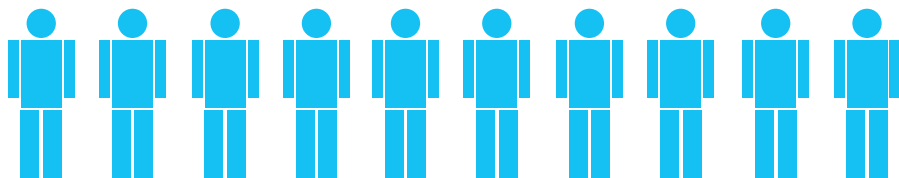
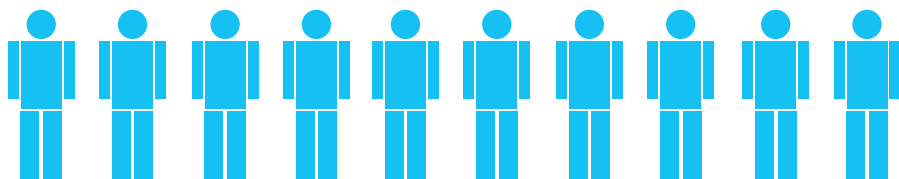
- a) 40 out of 55 Singapore's respondents have 2 years contract with their mobile phone operators.
- b) 8 are contract free.
- c) 7 have 1 year contract.
- d) none have 3 years contract.
- e) 50 out of 55 Singapore's respondents have gotten subsidies from their mobile operators.

## FINLAND

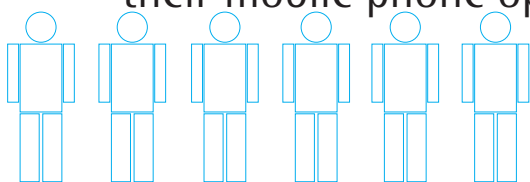
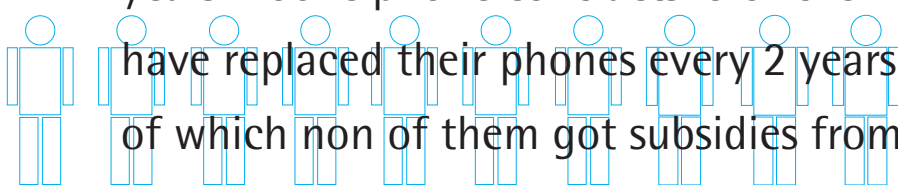
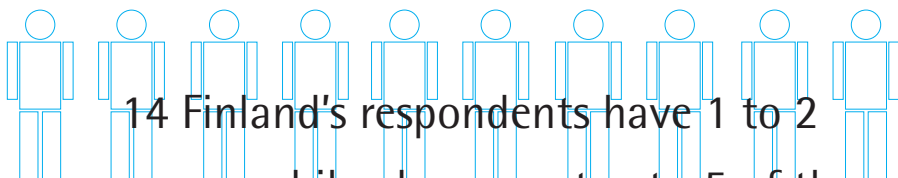
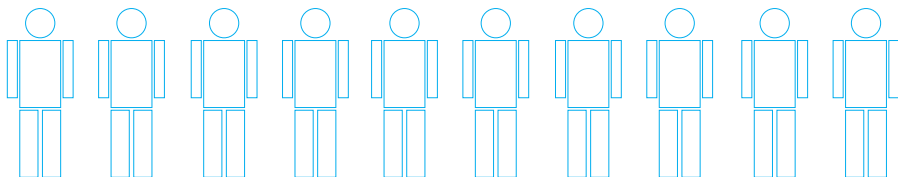
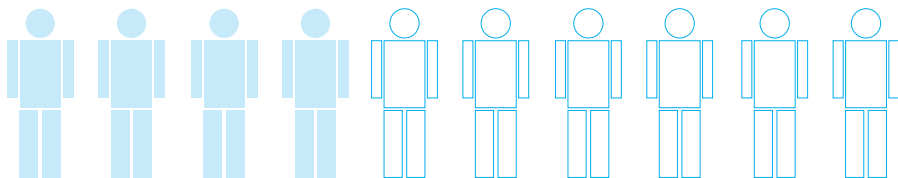
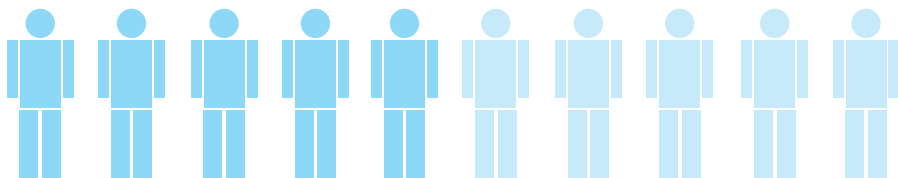
- a) 42 out of 56 Finland's respondents are contract free.
- b) 11 have 2 years contract with their mobile phone operators.
- c) 3 have 1 year contract.
- d) none have 3 years contract.
- e) 23 out of 56 Finland's respondents 'believed' they have gotten subsidies from their mobile operators.

47 Singapore's respondents have 1 to 2 years contract with their mobile operators. When the results of the replacement frequency and length of mobile contract are combined, 34 out of the 47 respondents who have 1 to 2 years contract have replaced their phones every 2 years, of which 30 of them have gotten subsidies from their mobile phone operators.

As for Finland, only 14 respondents have 1 to 2 years contract with their mobile operators. And out of the 14 respondents, only 5 have replaced their phones every 2 years, of which 2 of them knew they did not get subsidies from their operators, while the other 3 believe they did. In reality, there are no subsidies offered by Finnish mobile operators.



47 Singapore's respondents have 1 to 2 years mobile phone contracts. 34 of them have replaced their phones every 2 years, of which 30 of them have gotten subsidies from their mobile phone operators.



14 Finland's respondents have 1 to 2 years mobile phone contracts. 5 of them have replaced their phones every 2 years, of which non of them got subsidies from their mobile phone operators in reality.

Mobile phones replacement frequency vs. length of mobile contracts

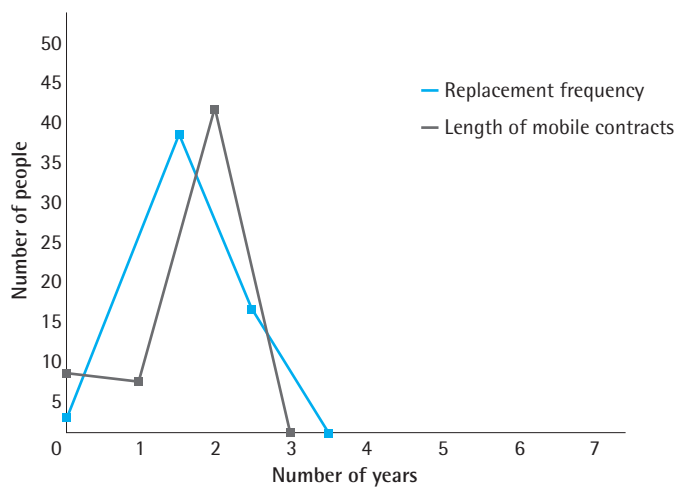


Figure 3: Data from Singapore

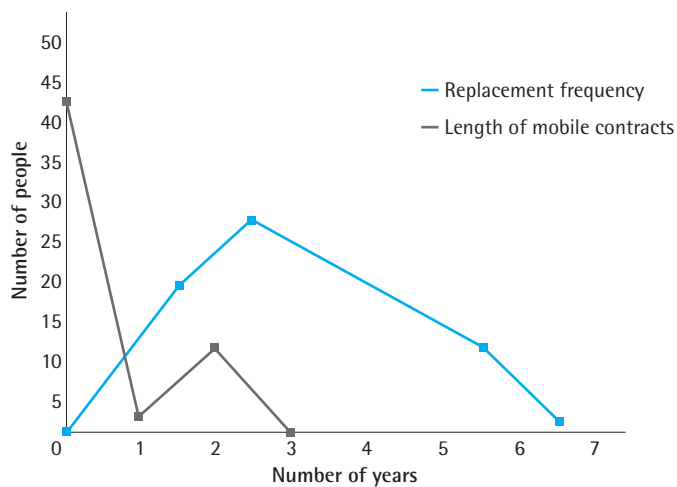


Figure 4: Data from Finland

Evidently, the length of mobile contracts and subsidies have significant influence on the replacement frequency. When both data are plotted on graphs, visibility of the influence is even more apparent (Figure 3 and 4).

The time of which Singapore's respondents replaced their mobile phones coincides with the length of their contracts. Commonly, when a consumer renews or signs a new contract with his/her mobile operator, he/she will be offered significant amount of subsidies for new mobile phone purchase. This presents the consumer an opportunity to get a new phone at a discounted price.

In addition to subsidies offered, it is also typical for the operator to offer a 'trade-in'. This is cash-back on the perceived value of the consumer's old mobile phone which can be used to offset the price of the new phone. Thus making acquiring a new mobile phone when renewing or signing new contract extremely desirable, which explains the why the time of replacement of mobile phone coincides with the time of contract renewal and/or acquiring of new contract .

While in Finland, the data showed there are no correlation between respondents' mobile phone replacement time and the length of their mobile contracts. This is due to the lack of attractive subsidies offered by mobile phones manufacturers and/or operators to significantly reduce the price of new mobile phones, and therefore discouraged frequent mobile phone replacement. It is therefore conclusive that Finland's respondents have misunderstood the survey question regarding mobile phone subsidies.

Drivers for mobile phones replacements

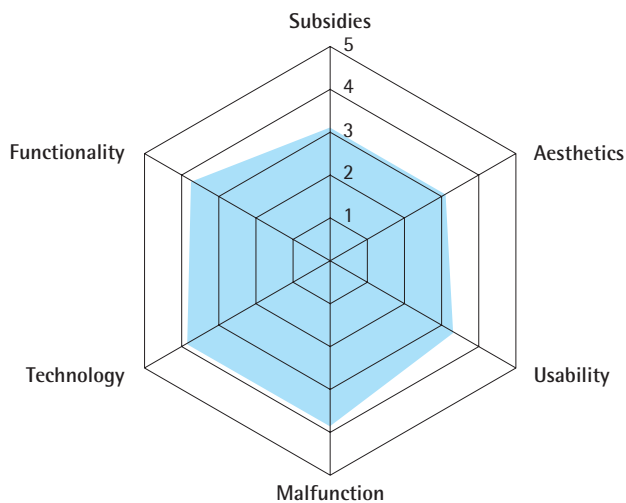


Figure 5: Singapore data

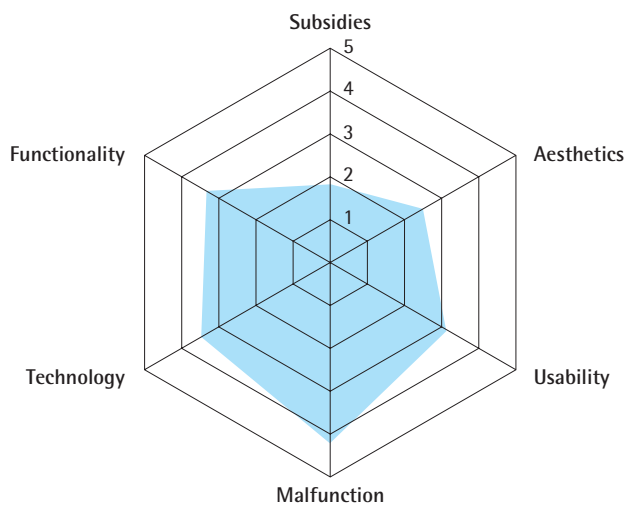


Figure 6: Finland data

### *Drivers for mobile phones replacement*

Six drivers for mobile phone replacement were identified and presented in the survey, they are functionality, usability, aesthetics, technology, malfunction and subsidies. The respondents were asked to rate the six drivers on the scale of 1 to 5, based on the degree of how much they agreed with the six drivers cited. 1 being least agreed upon and 5 being most agreed.

Collectively, Singapore's respondents chose malfunction as the main driver for mobile phone replacement. Secondary driver is the advance technology present in new mobile phones. Third driver for replacement is better functionality of new mobile phones. Interestingly, subsidies were thought to be the least influencing factor for mobile phone replacement amongst the respondents (Figure 5).

Finland's respondents thought the same when it comes to the three biggest drivers for mobile phone replacement. Most agreed that malfunction is the main driver for mobile phone replacement, followed by technology and functionality. Subsidies were also thought to be the the least influencing factor for mobile phone replacement (Figure 6).

With this information, one can safely deduce that there are certain amount of planned obsolescences present in mobile phones today. To obtain new mobile phone sales in a competitive and saturated market, manufacturers resort to technical obsolescence by applying incremental technological improvements on mobile phones, making old mobile phones look outdated, so to encourage replacements. Granted that technological advancement is necessary and inevitable, however the lack of after-sales services to refurbish mobile phones and keeping them up-to-date, is in itself a deliberate attempt in making sure old mobile phones go obsolete over time.

## **Secondary focus (b): Motivators and lack of motivators in repair and refurbishment**

### *Motivators in repair and refurbishment of mobile phones*

Slightly more than half of the Singapore's respondents have tried repairing their mobile phones before they replaced their old phones with new ones. In most circumstances, these phones were not under any warranties when they were sent for repair. Greater number of these respondents sent their phones to repair shop or other similar services. Few tried to repair the phones themselves. A handful got help from friends and families.

There is no clear indication as to what motivated them to try repair and refurbishment before buying new phones. Further investigations into other areas such as their personal backgrounds revealed that the biggest motivator is their shared views with regards to their method of disposal and their environmental concerns which drives them to first try repair services before deciding to replace their old phones. This group of respondents have different income levels and are from different age groups, thus age and income are not the defining factor in this case.

Surprisingly, less than half of the Finland's respondents have tried repairing their mobile phones before they replaced their old phones with new ones. Of which, majority of these phones were not under any warranties when they were sent for repairs. And a great number of these respondents serviced their phones themselves. Similarly, the motivations upon further investigation, showed that biggest motivator is their shared views with regards to their method of disposal and their environmental concerns which drove them to first try repair services before deciding to replace their old phones. However, there is a difference in the Finland's respondents. Majority of them belong to a middle age group (26 to 35) with income ranging from 20 to 35 thousands.



## SINGAPORE

- a) 30 out of 55 Singapore's respondents have tried to repair before buying new mobile phones. 25 did not.
- b) 13 out of 30 who have tried repairing, have warranties. 17 did not.
- c) 16 out of 30 who have tried repairing, hired repair services.
- d) 10 out of 30 who have tried repairing, did it themselves.
- e) 4 out of 30 who have tried repairing, got help from friends and families.

## FINLAND

- a) 25 out of 56 Finland's respondents have tried to repair before buying new mobile phones. 31 did not.
- b) 5 out of 25 who have tried repairing, have warranties. 20 did not.
- c) 8 out of 25 who have tried repairing, hired repair services.
- d) 16 out of 25 who have tried repairing, did it themselves.
- e) 1 out of 25 who has tried repairing, got help from friends and families.

### *Deterrents in repair and refurbishment*

Six deterrents in repair and refurbishment of old mobile phones were identified and presented in the survey, they are, lack of knowledge to do it themselves, no services provided, the price issue, the inconvenience of repair, phones that are beyond repair and the ease to simply buy new phones. The respondents were asked to rate the six deterrents on the scale of 1 to 5, based on the degree of how much they agreed with the six deterrents cited. 1 being least agreed upon and 5 being most agreed.

Less than half of the Singapore's respondents made no attempt in repairing their old mobile phones before acquiring new ones. Collectively, these 25 respondents agreed that the ease to simply buy new phones as the biggest reason for their lack of motivation in trying to repair their old mobile phones. The second biggest deterrent is the

# Deterrents in repair and refurbishment

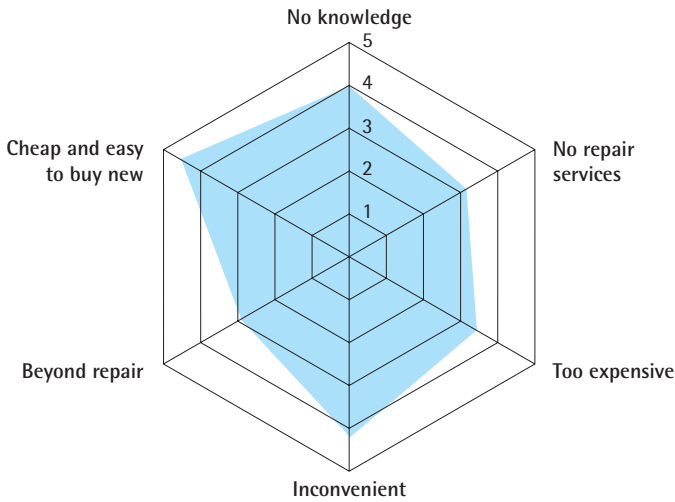


Figure 7: Singapore data

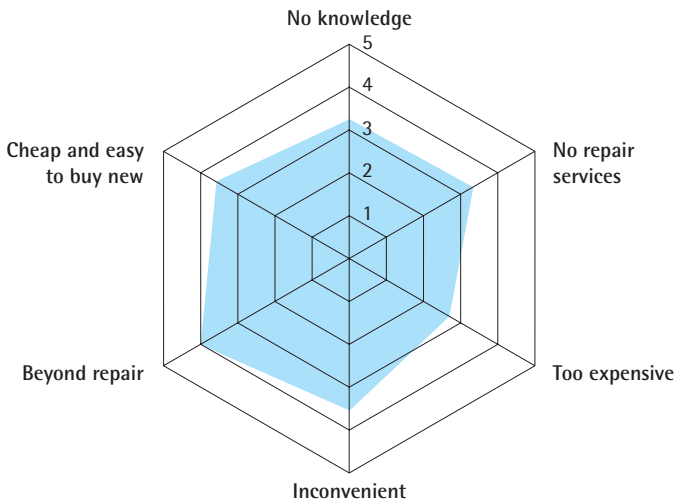


Figure 8: Finland data

inconvenience of repair. Third biggest deterrent is respondents' lack of knowledge to repair the phones themselves. Beyond repair is thought to be the least influencing factor in this instance (*see figure 7*).

In Finland, more than half of the respondents made no attempt in repairing their old mobile phones before acquiring new ones. 31 of them collectively agreed that beyond repair is the biggest reason why they did not try to repair their phones. Second biggest deterrent is the inconvenience of repair. Third biggest deterrent is the lack of repair services provided. Price seems to be the least influencing factor (*see figure 8*).

This data confirms the assumption made earlier that subsidy for new phone purchase is a contributing factor to frequent replacement of mobile phones. It is most apparent in the Singapore's survey that respondents felt it is cheap and easy to simply replace their old and/or malfunction phones with new ones, hence the lack of motivation in trying to repair and/or refurbish their mobile phones. As compared to Finland's respondents, in the absence of subsidy for new phone purchase, beyond repair is the bigger reason for replacement.

### **Main focus: Consumers' interest in the proposed repair and refurbishment services**

#### *Interest level in the proposed repair and refurbishment services*

This is the only non multiple choice question whereby respondents are able to express their opinions freely. There are many interesting point of views with regards to this question from both countries.

## SINGAPORE

Out of the 55 Singapore's respondents, 38 said they would be interested to try the repair and refurbished services. 14 respondents said they would not try and 3 were not sure if they would.

Among those who said they would support this service, some were more enthusiastic and showed concerns towards the environment and e-waste generation. Two respondents pointed out that "it will be a waste and a burden to the environment if we simply dispose something that's usable after refurbishment" and would support this service, so as to "save the environment". One respondent in particular, mentioned that he/she will try the service, "provided the repair service can guarantee less wastage on materials".

In general, most of the 38 respondents welcomed this service because they find it "a hassle having to transfer all phone numbers and data to new phones". However, a handful were somewhat skeptical about this service even though they said they would be interested to try. These respondents were concerned if their repaired and refurbished phones will function as good as new phones, with some suggested that "warranty should be given for repaired phones". While there were several others who mentioned that they would try the service "if it is convenient and cost effective to repair and refurbish" and "if the repair works and lasts long enough to justify the cost". Among some of these critical concerns, there were minor issues mentioned as well. These respondents cited that they would try the repair service provided if their phones were "not too outdated" and "if phone still looks new and worth repairing".

The majority of 14 respondents who said they would not try the repair and refurbish service, admitted that they "simply like to buy new phones". On top of that, they also believed that "phone servicing is a pain", "is expensive with no guaranteed results" and "it doesn't last". Other than these generic apprehensive sentiments towards repair and

refurbish services, there is one critical point mentioned by respondents with regards to repair time and cost. Phones repair service "cannot take more than a day" because they "cannot live a day without phones" and "cost has to be competitive with the third-party vendors available".

Among the 14 negative responses towards repair and refurbish services, one stood out from the crowd. This respondent is particularly adamant towards no repair for phones. He/she remarked that there was little need for repair services because "by the time it (phone) malfunctions, mobile operator would have new phone promotion where phones will be given for free".

3 who answered "maybe" to this question did not elaborate further. So the reasons are not definitive and remain unknown.

From previous section, we know that there are 30 Singapore's respondents who did try repairing their phones before replacing them, and 25 did not. Amid those 30 respondents who did try repair services before buying new phones, 7 of them unfortunately would not support the proposed repair and refurbish services. 7 out of the 25 who did not try repair before acquiring new phone, would still not try the proposed services and 3 were not sure if they will ever try.

The biggest issue brought up, among those who did try repair in the first instance and who would now not try the proposed services, is the warranty issue with repaired phones. Seems that they had tried repair services and were disappointed with the results, as one mentioned that "there were constant hiccups after repair and it was a waste of time, money and effort bringing the phone to service center". As for 7 who did not try repair in the first place and would still not try now, their reasons are that it is "expensive with no guaranteed results".

## FINLAND

Out of the 56 Finland's respondents, 32 said they would be interested to try the repair and refurbished services. 12 respondents said they would not try and 7 were not sure if they would. 4 gave very interesting point of view but were unclear in their choice if they would support the proposed services. 1 did not answer this question.

Likewise, Finland's respondents who were enthusiastic about the proposed services were well-informed with regards to e-waste and environmental issues. Many remarked that "it is more ecological to repair/update the old phone than to buy a new phone" and thought that the proposed repair and refurbish services is "more sustainable" and "good for the environment". Quite a number also responded that they saw little need in having "the latest gimmicks" or "the fanciest glossiest phone", and that tragically "there are too many low quality electronics manufactured and are not meant to be repaired".

Similarly, cost and time are of concern here. Finland's respondents mentioned that "it could be worth trying if it's really reasonable price and fast enough". Even though there was no mention of warranty for repaired phones, one respondent did insinuate that it would be great "if (repair) benefits are similar as having a new one".

The 12 respondents who answered "no" to this question, felt that "repair services in Finland are very expensive no matter how reasonable they claim to be" and that "new phones are cheap" so they would "rather invest time and money into buying new phone instead of repairing old phone". In most of these cases whereby respondents commented that buying new phones were cheaper than repair cost, they also mentioned that they were using basic phones which were only a fraction of the price of smart phones, therefore they did not see point in repairing.

Among those who were not supportive of the proposed services, there are a number of them who said that they had tried similar services and felt that "customer service is slow and doesn't function well" and "the (repair) process takes more than 2 weeks".

Most who answered "maybe" did not elaborate further, one however did mention his/her concerns regarding the convenience and price of the services rendered.

There were 4 respondents who gave ambiguous responses with regards to this question, however their opinions are just as important. Two of them mentioned about "planned obsolescence" in phones which they believed is due to "new software" which inhibits "update for phones past certain generations". They also believed that "manufacturers do this on purpose, to dictate the life of the smart phones". One other respondent cited that "an iPhone's cracked screen can cost as much as US\$300 to fix", which showed that "mobile phone manufacturers are not really interested to repair and refurbish beyond the single year warranty because it is an opportunity to sell more phones". Most of them were told by mobile phone repair services that there was "no sense of repairing". Though respondents thought that "it is a waste of material" as they had many old phones at home but they never "question that argument".

From previous section, we know that there were 25 Finland's respondents who did try repairing their phones before replacing them, and 31 did not. Amid those 25 respondents who did try repair services before buying new phones, 4 of them unfortunately would not support the proposed repair and refurbish services. 8 out of the 31 who did not try repair before acquiring new phone, would still not try the proposed services. And the 4 respondents who gave interesting viewpoints regarding mobile phone repair services but with responses that were ambiguous, had previously tried repairing their old mobile phones.

There are a couple of issues brought up, among those who did try repair in the first instance and who would now not try the proposed services. The reasons were "poor customer services", "long waiting time" and "expensive service fees". As for those who did not try repair in the first place and would still not try now, their reasons are that "new phones are cheap" and repairs are "too expensive".

### *The right servicing fees*

Regardless of the different type of response they gave for the proposed repair and refurbish services, all respondents were asked what they thought was the right servicing fees (not including phone parts).

#### SINGAPORE

- a) 26 out of 55 Singapore's respondents will pay less than 30 Singapore dollars for repair and refurbishment fees.
- b) 20 will pay between 31 to 50 Singapore dollars.
- c) 6 will pay between 51 to 100 Singapore dollars.
- d) 2 will pay between 101 to 150 Singapore dollars.
- e) 1 will pay more than 150 Singapore dollars.

#### FINLAND

- a) 27 out of 56 Finland's respondents will pay less than 30 Euros for repair and refurbishment fees.
- b) 17 will pay between 31 to 50 Euros.
- c) 10 will pay between 51 to 100 Euros.
- d) 2 will pay between 101 to 150 Euros.
- e) none will pay more than 150 Euros.



### *The right servicing time*

Similarly, all respondents were asked what they thought was the acceptable time frame for repair and refurbishment of mobile phones.

#### SINGAPORE

- a) 46 out of 55 Singapore's respondents thought that less than 1 week is reasonable time for repair services.
- b) 9 thought 1 to 2 weeks.
- c) none thought 3 to 4 weeks and beyond 4 weeks as reasonable time.

#### FINLAND

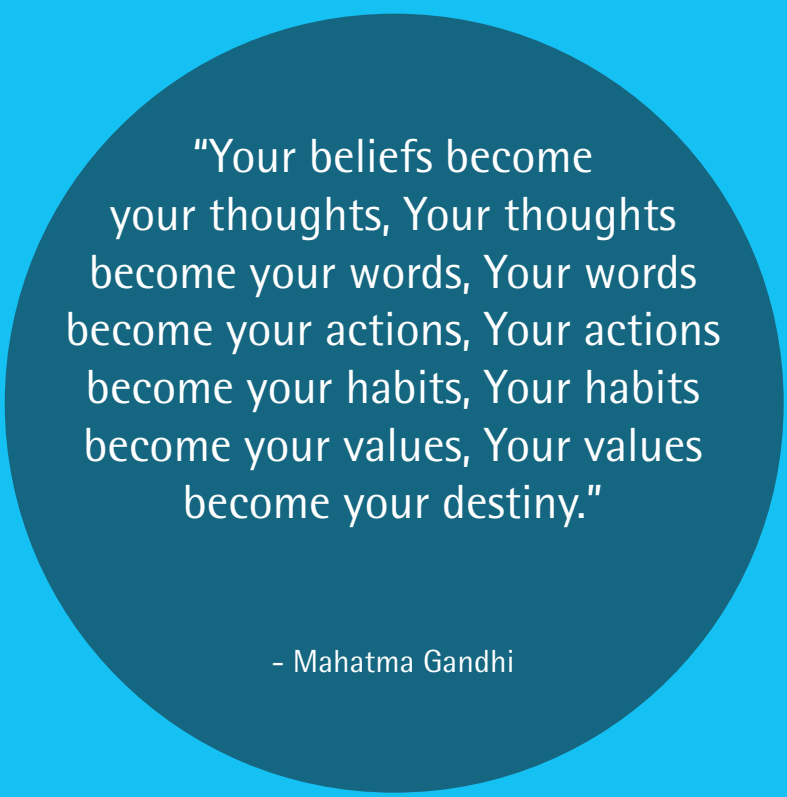
- a) 40 out of 56 Finland's respondents thought that less than 1 week is reasonable time for repair services.
- b) 15 thought 1 to 2 weeks.
- c) 1 thought 3 to 4 weeks.
- d) none thought beyond 4 weeks as reasonable time.

Insights gathered from the responses from both countries are: there are three main concerns with regards to the repair and refurbishment services – warranty, time and cost. With guaranteed results in repair and refurbishment that are within reasonable and acceptable service fees and time frame, these respondents are more than likely to use the repair and refurbish services provided.

There are also some trust issues mentioned here, particularly from those who had tried repair services and had gotten some bad experiences. For the proposed repair and refurbish services to succeed, consumers will have to feel confident about manufacturers and operators after-sales services. This may be the first issue the mobile manufacturers and operators have to proactively look into – changing the negative perception about their customer services.

Afterall, mobile phone manufacturers and operators have been focusing on sales and profit all this time and may have intentionally or unintentionally neglected their effort in providing reliable after-sales services for their customers.

Evidently, public awareness in the repercussion of rampant mobile phones replacement and the generation of e-waste is important. An informed and enlightened consumer is less likely to succumb to the temptation of frequent mobile phone replacement, as revealed in this survey findings.



"Your beliefs become  
your thoughts, Your thoughts  
become your words, Your words  
become your actions, Your actions  
become your habits, Your habits  
become your values, Your values  
become your destiny."

- Mahatma Gandhi

## CONCLUSION AND RECOMMENDATION

Current studies have shown that rampant consumption of mobile phones and rapid generation of electronic waste (e-waste) prevails in modern times largely due to consumers discarding their old mobile phones before they are worn out and/or refusal to send malfunction phones for repair and servicing. To understand this phenomena, I looked into the systemic issues surrounding the way we consume mobile phones; how mobile phone businesses operate and current recycling initiatives. I explored these points from various angles using existing literatures and consumer survey to better understand the fundamental issues in mobile phone consumption lifecycle which encompasses manufacturing, purchasing, usage and replacement. The intention for this exploration is to create a platform for discussion and evaluation of current theories/solutions and eventually, the introduction of my hypothesis and recommendations.

Many scholars believed that objects have transcended beyond their functionality into powerful symbols, enriched with meanings. Our obsessions with identifying and projecting our image together with these objects and their meanings explained the need for our desire to consume. However, consumption is inevitable and is not of an issue, if we simply consumed within our needs and not more. It is the over-consumption, the rampant discarding of old but functional objects and the insatiable hunger to acquire new objects that requires deeper understanding before we can find befitting solution for the problem we faced in today's rampant consumption of mobile phones.

Based on existing studies, excessive consumption is thought to be driven by consumers' lack of emotional durability towards consumer goods. Products today fail to capture consumers emotionally, resulting in dissatisfaction, thus causing consumers to lust after newer products and discard old products before their expiry date. In the consumers' mind, products/objects have different level of desirability based on the characteristics and properties present, and thus have different level

of emotional durability. In broad terms, there are three characteristics present in consumer goods – Functionality, Social/Positional qualities and Inspirational/Spiritual attributes.

Electronic products improve and intensify our lives in many different ways, particularly mobile phones. It is an essential part of our lives as our source of entertainment, connection to the world and personal computer, all in one device. Mobile phone has every characteristics of a Functional + Social/Positional object, it has values that are intrinsically bound with the technological advances and fashion, which resulted in quick replacement as soon as a new design or technology hits the stores. It is laden with features we associated with convenience, power and style. Mobile phones coupled with high-speed wireless data networks have put the power of communication and concept of modern living in the hands of the consumers. Having the latest gadget/technology has become the status symbol of an advanced civilisation.

Granted that technological advancement is inevitable, however, when mobile phones are manufactured to be unrepairable and not upgradable, it is planned obsolescence in the making. Incremental mobile technology are often dispatched as an annihilation to its predecessor. To obtain new mobile phone sales in a competitive and saturated market, manufacturers resorted to using technical obsolescence by applying incremental technological improvements on mobile phones, making old mobile phones outdated, so to encourage replacements. This strategy is often combined with aggressive advertising and marketing tactics, to bring about interest in new mobile phone models among consumers.

To encourage more mobile phone consumption, advertisers hired by manufacturers, used sophisticated techniques to emotionally manipulate consumers into acquiring new objects of desire, executed through

powerful visuals to induce definition and alteration of consumers' sense of self. With repeated promotion of such visual, consumers are coaxed into throwing away functioning products in exchange for new purchases.

Simultaneously, mobile phone manufacturers also collaborated with mobile phone operators (in most countries) in offering subsidy for new mobile phone purchase when consumers acquire new and/or renew mobile contract. Studies has shown that in countries where mobile operators offer contractual mobile services in conjunction with subsidised mobile phones, consumers are more likely to replace their mobile phones regularly, often coincide with the time frame of the contract agreement. In fact, subsidised mobile phone is one of the key contributing factor for faster replacements, as it alters consumer's perception of the price/value of mobile phone, hence finding new phone more attractive because of its affordability.

Evidently, rampant mobile phones replacement is an encouraged behaviour. We continue to see this behaviour among consumers today, especially in economically developed countries. Among many other short-lived products, mobile phones are the most problematic. They are widely distributed, sold, used and replaced in an average of every 2 to 4 years, generating tonnes of e-waste every year.

In the light of current development with regards to rampant mobile phones consumption and rapid e-waste generation, scholars specialised in sustainable studies often concurred that mobile phone needs to be more sustainable in its design. Established phone manufacturers such as Nokia, spent top dollars, focusing their research and development on having their phones produced entirely on recycled materials and/or making phone parts more recyclable. Despite efforts of sustainable design, consumers continue to replace their mobile phones rapidly, wasting resources but now with recycled materials.

In addition to Nokia's enormous achievements in innovating and manufacturing phones made-up of recycled materials, Nokia also provides consumers comprehensive recycling programme which includes 6000 collection points in 100 countries. Despite its efforts in providing recycling options for old mobile phones, it is reported that merely 3%\* of the world's population recycled their unused and unwanted mobile phones. The other unaccounted 97% may eventually discard their phones through mainstream waste system and create e-waste problems. In addition to the e-waste issues created, this is also an awful waste of finite resources such as minerals and precious metals, that we so relentlessly mined for, in order to manufacture these phones.

Most countries do not have the infrastructure and capacity to locally manage their e-waste. More often than not, e-waste are exported to developing countries in the guise of second-hand electronics for reuse, recycling or disposal purposes. This threatens the livelihood of developing countries and poisons their current and future generations, due to the fact that these countries lack the knowledge and facilities to properly recycle discarded electronics. Without proper training and protective gears, these informal recyclers exposed themselves daily to high level of toxins present in discarded electronic goods, which resulted in numerous health issues related to skin, stomach, respiratory tract and other organs.

Recycling in developing countries is not only morally wrong, it is futile, evidently from the prevailing e-waste issues we faced today. However, mobile phone manufacturers rather spend money and effort in recyclable phone innovation and recycling initiatives, than to provide repair and refurbish services such as hardware/software upgrades to their customers. It is no surprise why mobile phone manufacturers continue

---

\*Disputable data: Nokia consumer's website claimed 9% of the people recycled their phones as of 2012, whereas their research conducted in 2008 said that there are 3% of the world's population recycled their phone. And because I couldn't find legitimate research documents to back-up their latest claim, I chose to use their 2008 research data, which in this case - 3%.

to drive recycling initiatives. Recycling is more compatible with their business growth. Mobile phone businesses are fueled by conventional capitalism. The faster the consumers replace their mobile phones, the more mobile phone manufacturers will profit from the sales made. Recycling allows more consumption and provides an ethical liberation of the consumers' conscience, allowing consumers to think that their consumption and disposal habits are ecologically sound.

Putting primary sustainability effort in technological innovation and recycling is solving critical e-waste problem superficially. It is therefore an imperative to question the adequacy of conventional capitalism and look into finding a viable solution to stop generating more e-waste.

To eliminate or to slow down e-waste generation, waste management through recycling efforts are not sufficient. Reduction in consumption is a more realistic and pragmatic approach. If we can reduce our needs to frequently produce, purchase and discard, we will automatically produce less waste and require less raw materials for future manufacturing of new products. And if we are successful in trying to lessen the generation of e-waste, there will be little need to manage our e-waste issue through recycling.

To successfully prevent e-waste generation, it is pivotal that consumers reduce the frequency of mobile phone replacement significantly. However, this development will effect mobile phone manufacturers' profits. And since sales and profits are the driving force for businesses, the fundamental question we have to ask is: how can mobile phone manufacturers continue to make profits if phone replacements were to slow down considerably? Afterall, the purpose of this research is to find a sustainable solution to reduced mobile phone consumption and e-waste generation without hurting the mobile phone business, and at the same time, provide consumers the latest mobile phone technology.



The solution to rampant mobile phone consumption and e-waste problem is to introduce the Three 'R's strategy in the mobile phone consumption lifecycle. The trichotomy of Three 'R's is a waste reduction and material conservation strategy, comprises of a three steps method:

- 1) to **reduce** consumption and waste generated by producing less, buying less and hence throwing away less.
- 2) to **reuse** all that we could to avoid wasting of materials.
- 3) to **recycle** by extracting valuable materials from used products.

By adhering to the Three 'R's strategy, consumers will be able to **reduce** mobile phones consumption by repairing broken phones or upgrade old hardware such as processors or installing new softwares that work well with the hardware. This means that consumers get to **reuse** their old but newly improved devices for an extended period of time, thus increasing replacement time. And lastly, when consumers have repaired/upgraded all that they can and want or need new phones, they can then return their old phones back to mobile phone manufacturers for **recycling** while they buy new mobile phones.

With these three steps added into the mobile phone consumption lifecycle; we will be able to prolong the lifespan of mobile phones through constant repair and/or upgrade in software and hardware when necessary; we will be able to create alternative, if not, an additional revenue stream for mobile phone manufacturers due to the repair and refurbishing services they rendered; we will be replacing mobile phones less frequently because of the phone repair and refurbish services undertaken, keeping mobile phones in good working condition and up-to-date with the latest technology.

An online survey was conducted in two countries to test out this hypothesis - Singapore and Finland. The two countries were chosen for obvious reasons. Both countries have open economies, and are similar in their population size, disposable income and Human Development Index (HDI), which are strong indicators that both economies are robust and healthy, and that the population have ample and viable financial means for consumption spendings. In addition to the countries' similarities, there are disparities which can present an interesting juxtaposition in this research. Despite having similar disposable income, the replacement cycles are vastly different. Moreover, both countries' mobile phone operators offer different mobile phone contracts and deals notwithstanding the fact that these two countries have similar economic and technological infrastructure.

Through the responses gathered, I understand that there are three main drivers present in the consumption lifecycle which encourage frequent mobile phones replacement. First and foremost, the subsidies for new phone purchases offered by mobile phone operators. The second driver is phone malfunction and incremental improvement of phone technology. Last but not least, the lack of reliable after-sales repair and refurbish services available.

When data collected from Singapore is compared to Finland's data, I found that there are strong correlation between replacement cycle and subsidies offered for new phone purchases inconjunction with mobile contract renewal and/or new mobile contract.

Singapore operators offer subsidies for new mobile phone purchases when consumers renew or sign new mobile phone contracts, while Finnish mobile phone operators do not have such offers. Interestingly, the data collected showed that Singapore's respondents mobile phone replacement cycle often coincides with the contract renewal time, which in this case is every 2 years.

Finland's respondents data showed no correlation between respondents' mobile phone replacement time and the length of their mobile contracts. This I believe is due to the lack of attractive subsidies offered by mobile phones operators to significantly reduce the price of new mobile phones, and therefore discouraged frequent mobile phones replacement.

Finland's respondents showed more varied results when it comes to mobile phone replacement time, ranging from 2 to 6 years. Most of them do not have mobile contract with their operators, thus their mobile phone replacement cycle is not dictated by their mobile contract with their operators. Finland's respondents replaced their mobile phones due to other reasons - malfunction and technology improvement.

Evidently, subsidies for new phone purchases is also a big reason for having contracts with mobile operators. And in Finland's case, the absence of attractive subsidies is why most respondents do not have mobile contracts with their operators.

The second reason which drives rampant mobile phones replacement stems from two tracks - malfunction of mobile phone and outdated mobile phone technology. In scenario one, phones are not in perfect working condition of either the hardware or software, largely due to new software updates provided by mobile phone manufacturers that are not compatible with the old hardware, thus resulting in slow operations or total incapacitation. In scenario two, phones are in perfect working condition, however, they lack the latest technology and advance features of new phones.

We know that in today's day and age, fast effective communication equates to power and that holding onto malfunctioned or outdated phones is not an option consumers are willing to consider. Therefore when the above-mentioned scenarios are combined with the lack of

reliable after-sales repair and refurbish services (third driver); there is only one outcome to this development: consumers are coerced into replacing their mobile phones regularly, creating enormous amount of e-waste waiting to be managed through recycling efforts.

Current after-sales services are not only unreliable, they are also limited when it comes to refurbishment. Mobile phones are made not upgradable when it comes to hardware such as motherboards or processors. Therefore current available refurbishments are limited to aesthetic aspects such as screens and covers. Providing upgrades to hardwares are important in the light of current mobile phone consumption situation, especially when phone technology advances ever so quickly. Moreover, survey showed that aesthetics is the least reason for mobile phones replacement, hence consumers are not too concern about scratched screen or cover, unless it hinders the phone's operation.

Both countries' respondents also showed prejudice towards repair and refurbish services, even though majority said they would try the proposed services. Most perceived repair as a cumbersome and costly affair with no guaranteed result. This response is an expected outcome. With repair and refurbish services often outsource to third parties who cater less than desirable customer services, consumers have come to distrust repair services overtime. The other concern cited by respondents is the warranty issue. New mobile phones come with one to two years warranties whereas repaired or refurbished phones do not. Most respondents believe that buying new mobile phones is a smarter choice economically.

There is a noteworthy insight found in the survey results from both countries. Those who are concerned with regards to the environmental repercussion of their disposal methods are more likely to first try repair

before replacing their mobile phones. And even more surprisingly, non of these respondents have tried to send their old mobile phones to any recycling facilities. Once again proven that recycling initiatives are futile.

Having analysed the opinions and concerns of respondents from both countries, there are a few recommendations and adjustments deemed necessary to ensure guaranteed success in introducing the Three 'R's strategy in the mobile phone consumption lifecycle:

- Repair and refurbish services cost has to be reasonable. Majority of the respondents thought that servicing fee should be less than 50 Euros/Singapore dollars.
- Repair and refurbish time has to be fast, not exceeding a week.
- Warranty should also be given for all services rendered. In the event of unresolved issues found after repair and refurbishment, consumers' interest are covered.
- Refurbishment service should include upgrading of important hardwares parts such as motherboards and/or processors. Keeping mobile phones in good working condition and up-to-date with the latest technology.
- Build good customer relations through reliable after-sales services. This will create a paradigm shift in consumers' mind with regards to repair and refurbish services. Overtime consumers will perceive that repair and refurbishment is as good as buying new.
- To encourage more repair and upgrade of mobile phones among consumers, mobile operators and manufacturers should stop giving subsidies for new phone purchases inconjunction with mobile phone contractual agreements.

- Public awareness with regards to the repercussion of rampant mobile phones replacement and the generation of e-waste is important. An informed and enlightened consumer is less likely to succumb to the temptation of frequent mobile phone replacement.
- In addition to manufacturers' interest in innovating recyclable and/or phones produced out of recycled materials, there is one other innovation they can look into. That is to design and manufacture modular type phones which enable fast and cost effective ways to repair and upgrade of hardware parts.

Current mobile phones come in all shapes and sizes, which resulted in hardware parts such as processors and/or motherboards being in different shapes and sizes too. To have the right type of hardware parts readily available, so as to expedite repair or upgrade, will mean that manufacturers need to have access to these different parts 24/7. The implication is that these hardware parts will have to be produced and stored in close proximity to the repair shops, ready for usage when the needs arise.

It is not only uneconomical, it is logistically impossible to have all types of different hardware parts available for usage at all times. Not to mention, the extra cost to produce and store these parts will most possibly be transferred onto the consumers. Thus keeping the repair cost within the reasonable and acceptable range, of which the respondents were adamant about, will be an uphill struggle for mobile phone manufacturers.

It is with this insight that this research recommends a modular type phone. The notion of a modular phone is liken the concept of 'Lego' bricks. The hardware parts of a mobile phone should be designed in ways that allow parts to be interchangeable and integrable, so as to anticipate foreseeable future repairs and upgrades.

Current mobile phones are designed and produced in expectation of frequent and rapid replacement, which caused mounting issues with regards to e-waste. If we want to reduce e-waste generation without having to cut-back on our advance mobile phone technology and reducing profits in mobile phone business, modular type phones seem to be an appropriate solution. Its proposition adheres with the Three 'R's strategy, which supports repair and upgrade of mobile phones for prolong usage.

Henceforth, it is imperative that further research will be required with regards to repair and upgrade services and modular phone technology before market implementation. Rigorous consumer's studies and consumer focus groups will give more in-depth analysis, in anticipating the actual market responses to new services and/or new product.

Though this research is an indicative representation of the current mobile phone consumption situation and not a reflection of the entire population from both countries, due to small number of respondents participation. The analysis gathered is nonetheless insightful, particularly when it corresponded with the existing studies found. Our current rampant mobile phone consumption is an encouraged behaviour, brought about by mobile phones manufacturers, through incremental technological advances, marketing tactics such as subsidy for new phone purchase and planned obsolescence in the guise of unrepairable and not upgradable mobile phones. And it is conclusive that with the introduction of Three 'R's strategy in the mobile phone consumption lifecycle, we can successfully reduce e-waste generation, keep mobile phone businesses viable and allow consumers to own the latest mobile phone technology.



Photo courtesy of Shutterstock



## ENDNOTES

121 /  
Utopia /  
Endnotes

### Introduction

1. Sara Nordbrand, Out of Control: E-Waste Trade Flows from the EU to Developing Countries, SwedWatch, April 2009, p5
2. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p8
3. Ibid
4. Market Information and Statistics Division, Telecommunication Development Bureau, The World in 2010: ICT Facts and Figures, International Telecommunication Union (ITU), 2010, p1
5. Roger Entner, International Comparisons: The Handset Replacement Cycle, Recon Analytics, 23 June 2011, p2
6. Nokia, Nokia Care Recycling Service Training, 2008, p6
7. Ann Arbor, Cell Phones All Contain Toxics: Older Ones the Most, Environment News Service, October 11 2012, p1
8. Bernard London, Ending the Depression Through Planned Obsolescence, 1932, p2
9. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p5-7
10. Ibid

11. Johanna Pietikäinen, A Slow Start at the Beginning of the Recycling Chain: How to Make Consumers Recycle Their Mobile Phones?, Master's Thesis of the Environmental Sciences, Department of Biological and Environmental Sciences, Faculty of Biosciences, University of Helsinki, 2007, p36

12. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p10

## 1. Human-object relationship

1. Philipp W. Stockhammer, Performing the Practice Turn in Archaeology, Ruprecht-Karls-Universität Heidelberg, Transcultural Studies No 1 (2012), p7-8
2. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p41
3. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p58
4. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p53
5. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p29
6. Ibid
7. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p38
8. Stuart Walker, Sustainable by Design: Explorations in Theory and Practice, Earthscan, 2006, p39-44
9. Ibid
10. Roger Entner, International Comparision: The Handset Replacement Cycle, Recon Analytics, 2011, p1

## **2. Business agenda**

1. North Carolina State University. "The Industrial Revolution." <http://www4.ncsu.edu/unity/users/p/pwhmds/indrev.html>.
2. Marcel Metze, Anton Philips (1874 - 1951): They will know who they're dealing with, Balans Publishers, 2004, p3
3. Time Magazine. "CORPORATIONS: A Very Tough Baby." <http://www.time.com/time/magazine/article/0,9171,803625,00.html>. July 23 1945.
4. Bernard London, Ending the Depression Through Planned Obsolescence, 1932, p2
5. Wikipedia. "Planned obsolescence." [http://en.wikipedia.org/wiki/Planned\\_obsolescence](http://en.wikipedia.org/wiki/Planned_obsolescence). 22 February 2013.
6. Tim Hindle, Guide to Management Ideas and Gurus, The Economist, Profile Books Ltd, 2008, p147
7. Ibid
8. Stuart Walker, Sustainable by Design: Explorations in Theory and Practice, Earthscan, 2006, p73
9. Roger Entner, International Comparision: The Handset Replacement Cycle, Recon Analytics, 2011, p2
10. Market Information and Statistics Division, Telecommunication Development Bureau, The World in 2010: ICT Facts and Figures, International Telecommunication Union (ITU), 2010, p1

11. Apple. "Iphone 5: The biggest thing to happen to iPhone since iPhone." <http://www.apple.com/iphone/>. 2013.

12. Roger Entner, International Comparision: The Handset Replacement Cycle, Recon Analytics, 2011, p8

13. Ibid

14. Roger Entner, International Comparision: The Handset Replacement Cycle, Recon Analytics, 2011, p4

### **3. Recycling is not the solution**

1. Sara Nordbrand, Out of Control: E-Waste Trade Flows from the EU to Developing Countries, SwedWatch, April 2009, p5
2. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p8
3. Sara Nordbrand, Out of Control: E-Waste Trade Flows from the EU to Developing Countries, SwedWatch, April 2009, p11
4. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p8
5. John D Lincoln, Oladele A Ogunseitan, Andrew A Shapiro, Jean-Daniel M Saphores, Leaching Assessments of Hazardous Materials in Cellular Telephones, Department of Chemical Engineering and Materials Science, Public Health Program, College of Health Sciences, University of California, USA, Environmental Science & Technology Vol 41, No. 7, 2007, p 2572-2578.
6. CBC News. "E-waste mounting in developing countries: UN." <http://www.cbc.ca/news/technology/story/2010/02/22/tech-e-waste-report.html>. February 22 2010.
7. Eric V. Hull, Poisoning the Poor for Profit: The Injustice of Exporting Electronic Waste to Developing Countries, Duke Environmental Law & Policy Forum Vol. 21:1, 2010, p2-3
8. Sara Nordbrand, Out of Control: E-Waste Trade Flows from the EU to Developing Countries, SwedWatch, April 2009, p11

9. Sara Nordbrand, Out of Control: E-Waste Trade Flows from the EU to Developing Countries, SwedWatch, April 2009, p17
10. Eric V. Hull, Poisoning the Poor for Profit: The Injustice of Exporting Electronic Waste to Developing Countries, Duke Environmental Law & Policy Forum Vol. 21:1, 2010, p30-31
11. Sara Nordbrand, Out of Control: E-Waste Trade Flows from the EU to Developing Countries, SwedWatch, April 2009, p34
12. Eric V. Hull, Poisoning the Poor for Profit: The Injustice of Exporting Electronic Waste to Developing Countries, Duke Environmental Law & Policy Forum Vol. 21:1, 2010, p15-16
13. Eric V. Hull, Poisoning the Poor for Profit: The Injustice of Exporting Electronic Waste to Developing Countries, Duke Environmental Law & Policy Forum Vol. 21:1, 2010, p25
14. Eric V. Hull, Poisoning the Poor for Profit: The Injustice of Exporting Electronic Waste to Developing Countries, Duke Environmental Law & Policy Forum Vol. 21:1, 2010, p22
15. Sara Nordbrand, Out of Control: E-Waste Trade Flows from the EU to Developing Countries, SwedWatch, April 2009, p20-21
16. Eric V. Hull, Poisoning the Poor for Profit: The Injustice of Exporting Electronic Waste to Developing Countries, Duke Environmental Law & Policy Forum Vol. 21:1, 2010, p19

17. Eric V. Hull, Poisoning the Poor for Profit: The Injustice of Exporting Electronic Waste to Developing Countries, Duke Environmental Law & Policy Forum Vol. 21:1, 2010, p28-30

18. Ibid

19. Mathias Schluep, Christian Hagelueken, Ruediger Kuehr, Federico Magalini, Claudia Maurer, Christina Meskers, Esther Mueller, Feng Wang, Recycling – From E-Waste To Resources, United Nations Environment Programme & United Nations University, 2009, p41-46

20. Sara Nordbrand, Out of Control: E-Waste Trade Flows from the EU to Developing Countries, SwedWatch, April 2009, p19

21. Ibid

22. Sara Nordbrand, Out of Control: E-Waste Trade Flows from the EU to Developing Countries, SwedWatch, April 2009, p7

23. Ibid

24. Sara Nordbrand, Out of Control: E-Waste Trade Flows from the EU to Developing Countries, SwedWatch, April 2009, p22-23

25. Nokia, Nokia Care Recycling Service Training, 2008, p6

26. Ann Arbor, Cell Phones All Contain Toxics: Older Ones the Most, Environment News Service, October 11 2012, p1



27. Eric V. Hull, Poisoning the Poor for Profit: The Injustice of Exporting Electronic Waste to Developing Countries, Duke Environmental Law & Policy Forum Vol. 21:1, 2010, p17

28. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p10

#### 4. Consumers' dilemma

1. Nokia, Nokia Care Recycling Service Training, 2008, p6
2. Ann Arbor, Cell Phones All Contain Toxics: Older Ones the Most, Environment News Service, October 11 2012, p1
3. Eric V. Hull, Poisoning the Poor for Profit: The Injustice of Exporting Electronic Waste to Developing Countries, Duke Environmental Law & Policy Forum Vol. 21:1, 2010, p2-3
4. Nokia. "Ota yhteyttä." <http://www.nokia.com/fi-fi/tuki/yhteystiedot/>. 2013.

## 5. Looking back, moving forward

1. Pongrácz E, Phillips PS & Keiski RL (2004) From waste minimization to resources use optimization: Definitions and legislative background. In: Pongrácz E (ed.) Proceedings of the Waste Minimization and Resources Use Optimization Conference. June 10th 2004, University of Oulu, Finland. Oulu University Press: Oulu. p.11- 20.
2. World Class Communications Technologies, LLC, 3 R's of Sustainability: Reduce Reuse Recycle, World Class Communications Technologies, LLC, 2011, p2
3. Sheryl Eisenberg, "This Green Life: The 3R's Still Rule." Natural Resources Defense Council. <http://www.nrdc.org/thisgreenlife/0802.asp>. February 2008.
4. Jonathan Chapman, Emotionally Durable Design: Objects, Experiences and Empathy, Earthscan, 2005, p10
5. Nokia. "Sustainable mobile products: Nokia Lumia 820." <http://www.nokia.com/global/about-nokia/people-and-planet/sustainable-devices/sustainable-devices/>. September 2012.
6. Greenpeace. "Greenpeace Guide to Greener Electronics." <http://www.greenpeace.org/international/en/campaigns/toxics/electronics/Guide-to-Greener-Electronics/>. November 2012.
7. Nokia, "Nokia 700 Eco profile." <http://i.nokia.com/blob/view/-/198844/data/3/-/700-Eco-profile-pdf.pdf>. August 2011.
8. Greenpeace. "Greenpeace Guide to Greener Electronics." <http://www.greenpeace.org/international/en/campaigns/toxics/electronics/Guide-to-Greener-Electronics/>. November 2012.

9. Pongrácz E, Phillips PS & Keiski RL (2004) From waste minimization to resources use optimization: Definitions and legislative background. In: Pongrácz E (ed.) Proceedings of the Waste Minimization and Resources Use Optimization Conference. June 10th 2004, University of Oulu, Finland. Oulu University Press: Oulu. p.11– 20.
10. Wikipedia. "Recycling." <http://en.wikipedia.org/wiki/Recycling>. 7 February 2013.
11. Joshua Chan, Zhisui Chen, Irene Cormane, Nou Her, Renie Thomas, Cell Phone Industry Analysis, California State University Sacramento, May 2006, p2, 10
12. Dr Patrick Xavier, Behavioural Economics And Customer Complaints In Communication Markets, Australian Communications and Media Authority, May 2011, p11
13. Roger Entner, International Comparision: The Handset Replacement Cycle, Recon Analytics, 2011, p2

## 6. Look deeper (the questionnaire)

1. Magnus Blomström, Ari Kokko, Fredrik Sjöholm, Growth And Innovation Policies For A Knowledge Economy: Experiences From Finland, Sweden, And Singapore, Stockholm School of Economics, October 2002, p3
2. Euromonitor International. "Statistic Reference, Country Factile: Finland." <http://www.euromonitor.com/finland/country-factfile>, <http://www.euromonitor.com/singapore/country-factfile>. Jan 2011.
3. Ibid
4. Jeni Klugman et al., Human Development Report 2011, Sustainability and Equity: A Better Future for All, United Nations Development Programme, Palgrave Macmillan, 2011, p127
5. United Nations Environment Programme. "About Human Development." <http://hdr.undp.org/en/humandev/>.
6. Dictionary.com. "Disposable income." <http://dictionary.reference.com/browse/disposable%20income?fromAsk=true&to=100074>.
7. D. J. Kruger, Integrating quantitative and qualitative methods in community research, The Community Psychologist, 2003, 36, p18-19



## APENDICES

### Appendix I

**1. Functional:** Tools, weapons and everyday pottery are valued primarily for their usefulness. If a tool is ineffective then its value is severely diminished – it would be described as 'useless'. Similarly, a weapon is judged by its usefulness in hunting or in affording protection, and a ceramic pot by its ability to hold liquid. These objects are designed to accomplish practical tasks; design considerations focus on effectiveness, safety and user comprehension.

**2. Social/Positional:** Jewellery items such as necklace, earrings and bracelets; products such as cosmetics and tattoos; and badges, brooches and medals are all non-utilitarian. While they serve a purpose, they are not practical implements or utensils. Instead, they are used to express identity, to be decorative, to enhance one's appearance, to indicate one's rank, achievement or affiliation. Their chief characteristics are their social or positional qualities; they serve as social signifiers that can enhance one's sense of self-esteem, one's social acceptance or indicate one's social standing.

**3. Inspirational/Spiritual:** This category includes religious statuary and icons, and fine art objects. All these things refer to or convey inspiring, sacred or spiritual ideas; they are physical expressions of profound understanding and beliefs, and because of this they are considered deeply meaningful. They often have religious, magical or talismanic associations and can serve as reminders or touchstones for our most deeply felt yearnings.

## Appendix II

**1. Social/positional + Inspirational/Spiritual:** This category includes things such as ornaments, commercial art pieces, souvenirs, home decor items, and statuary or art objects that have social/positional meanings attributed to them, such as status, esteem or personal identity. This can also include items based on traditional cultures and religions such as the commercially produced Haida Masks of the Canadian west coast. These types of sculptures are produced today for tourist or collectors markets and in the process changes occur. Some of these changes can be positive, creating new opportunities for artistic expression while simultaneously opening up new avenues for economic development and self-determination. The changes can also be negative, especially when the objects become modified, cliched, and stereotyped in order to serve the market. When these non-functional objects become commercialised, their religious, ritualistic or cultural significance is no longer relevant, they become primarily decorative and there is a danger of them becoming a pastiche or falling into kitsch. In terms of sustainability, these object types do not pose much of a problem – on the contrary, their production can be a valuable contribution. They are generally 'low tech' and are frequently handmade at the local level, employing local skills, cultural and aesthetic sensibilities, and perpetuating cultural ties, albeit in some cases in a new and often diluted form; but if taken to extremes this last point can become destructive to a culture's heritage. Nevertheless, opportunities for local employment using local materials and local design are often socially and economically beneficial, and environmentally of relatively low impact. Furthermore, The handmade and personal or cultural significance of these artefacts means that the people who buy them will often keep them for a long time – even passing them down from one generation to another. They are often regarded as precious personal possessions and they may have a heritage value, which in turn prevents them entering the waste stream.



**2. Functional + Social/Positional:** This category includes consumer goods such as automobiles, watches, music equipment, footwear and designer-labelled goods. All these possess positional value in addition to their essential utility. These are functional products that set one apart from the crowd and in terms of sustainability they are, by far, the most problematic. To a great extent these are mass-produced goods which are promoted and distributed globally; they drive consumerism and are the cause of many environmental and social ills. These objects not only combine functionality with positional value, they also become quickly outdated. There are two main reasons for this: firstly, both their functionality and their positional value are intimately connected to advances in technology, and secondly, their positional value is tied to changes in fashion and styling. Within our contemporary market-driven, mass-production system, the linking of technological progress and/or styling with social status has become an extremely potent combination. Today virtually all our utilitarian goods have the potential to be positional, from cars and audio products to refrigerators, kettles and bathtubs. When this occurs an object's value is determined not simply by its ability to properly function, but also by its ability to convey social position, aspiration or affiliation. However, the positional value of these types of objects is inevitably short-lived because technology is always advancing and styling is always changing. These factors spawn the upward spiral of consumerism that is so environmentally and socially problematic.

**3. Functional + Social/Positional + Inspirational/Spiritual:** This category includes objects related to religion and particularly to forms of prayer, for example a Muslim prayer mat, a Buddhist prayer wheel or a Jewish prayer shawl. Each of these articles serves a functional purpose: the prayer mat defines a space for prayer, every rotation of the prayer wheel represents a prayer's recitation, and the prayer shawl is a mnemonic. Inseparable from these functions, each has a symbolic religious or spiritual significance, and each is a signifier of social

identity and, potentially, each may also be associated with social status or position. These are important religious and cultural artefacts that all pertain to our inspirational or spiritual understandings, and each is 'used' in an active, functional way that is quite different from a religious statue or painting. These types of artefacts are considered precious because of their sacred associations and their design and use are steeped in tradition. Consequently, they are not simply discarded when a newer model or style comes along. They can therefore be described as sustainable; they have a long history in human society, they are highly valued and they have profound meaning.

Appendix III

Apple's iPhone technical improvements since 2007:

<div><div>TYPE</div><div>FUNCTION</div></div>	iPhone	iPhone 3G	iPhone 3Gs	iPhone 4	iPhone 4s
Processor	ARM 11 412 MHz	ARM 11 412 MHz	ARM Cortex A8 600 MHz	A4 1 GHz	Dual-core A5 1 GHz
Display	320x480 pixels 3.5 inch	320x480 pixels 3.5 inch	320x480 pixels 3.5 inch	640x960 pixels 3.5 inch Retina	640x960 pixels 3.5 inch Retina
Camera	2 MegaPixel Fixed-focus	2 MegaPixel Fixed-focus	3.2 MegaPixel Auto-focus	5 MegaPixel Auto-focus/Flash	8 MegaPixel Auto-focus/Flash
Front Camera	Unavailable	Unavailable	Unavailable	Yes	Yes
Video Camera	Unavailable	Unavailable	Yes	Yes	Yes
Video Calls	Unavailable	Unavailable	Unavailable	Yes	Yes
Connectivity	Bluetooth/WiFi	Bluetooth/WiFi	Bluetooth/WiFi	Bluetooth/WiFi	Bluetooth/WiFi
Data Network Support	2G	3G	3G	3.5G	4G
GPS	GPS	Assisted-GPS	Assisted-GPS	Assisted-GPS	Assisted-GPS
Launch Date	2007	2008	2009	2010	2011

## Appendix IV

### Mobile phone subsidisation: The iPhone 4G case study.

	Operator	Unsubsidised iPhone Price in PPP\$	Subsidised iPhone Price in PPP\$	Phone subsidy in PPP\$ off \$600 ASP	Income in PPP\$	2010 phone replacement cycle (months)
Brazil	Claro	n/a	\$739	\$67 profit	\$11,239	80.8
Canada	Bell	\$540	\$131	\$529	\$39,057	33.0
Finland	Sonera	\$871	\$576	\$84	\$34,585	74.5
France	Orange	\$710	\$263	\$379	\$34,077	30.8
Germany	T-Mobile	\$662	\$187	\$473	\$36,033	45.7
India	n/a	n/a	n/a	n/a	\$3,339	93.6
Israel	n/a	n/a	n/a	n/a	\$29,531	76.5
Italy	TIM	\$879	\$309	\$351	\$29,392	51.5
Japan	Softbank	n/a	\$104	\$556	\$33,805	46.3
Korea	SK	\$724	\$161	\$499	\$29,836	26.9
Mexico	Telcel	\$1,233	\$963	\$303 profit	\$14,430	39.6
South Africa	Vodacom	n/a	\$1999	\$1,309 profit	\$10,498	38.2
United Kingdom	Orange	\$797	\$0	\$660	\$34,920	22.4
United States	AT&T	\$599	\$200	\$460	\$47,284	21.7

*Note: Based on the number of phones sold and revenues of iPhone 4G in the first quarter of 2011, it is determined that the ASP of iPhone is \$660.*

*ASP = Average Selling Price , PPP = Purchasing Power Parity.*

## Apendix V

### 1. Country of residence?

- Finland
- Singapore

### 2. Age?

- Below 16
- 17 to 25
- 26 to 35
- 36 to 45
- 46 to 60
- 61 and above

### 3. What is your occupation?

- Accounting / Finance
- Admin / HR
- Sales / Marketing
- Arts / Media / Communication
- Services
- Sciences
- Computer / IT
- Engineering
- Manufacturing
- Building / Construction
- Hotel / Restaurant
- Education / Training
- Healthcare
- Other:

4. What is your gross annual income? \*
  - Less than 20,000
  - 20,001 to 35,000
  - 35,001 to 50,000
  - 50,001 to 65,000
  - More than 65,000
  
5. What type of mobile phone are you using now?
  - Basic phone
  - Smart phone
  - Business phone
  
6. How often do you buy a new mobile phone?
  - Less than 12 months
  - 1 to 2 years
  - 3 to 4 years
  - 5 to 6 years
  - more than 6 years
  
7. I buy new mobile phone because new mobile phone has more and better functions.
  
8. I buy new mobile phone because new mobile phone is more user friendly.
  
9. I buy new mobile phone because new mobile phone is more stylish.
  
10. I buy new mobile phone because new mobile phone is technologically more advance.
  
11. I buy new mobile phone because my old phone is damage due to hardware/software malfunction.

12. buy new mobile phone because mobile operator offers attractive subsidies for new mobile phone purchase.

*(On the scale of 1 to 5, choose what is most applicable to you)*

1    2    3    4    5  
Disagree                      Agree

13. What did you do with your old mobile phone?

- Trade-in for new phone
- Sell it on eBay (or similar portals)
- Send to recycling centre
- Pass it to families and friends
- Store at home
- Discard

14. Are you concerned about how your old mobile phone is being disposed?

- Yes
- No

15. Have you tried to repair, update softwares and/or reinstall operating systems on your old mobile phone before you decide to buy a new one?

- Yes
- No

16. Was the mobile phone still under warranty when it requires repair, update softwares and/or reinstall operating systems?

- Yes
- No

17. How did you go about repairing, updating softwares and/or reinstalling operating systems on your old mobile phone?

- Send to repair and refurbish services to do it
- Do-It-Yourself (DIY)
- Get families and/or friends' help

18. I haven't tried repairing, updating softwares and/or reinstalling operating systems on my old mobile phone because I don't have the knowledge to do so.

19. I haven't tried repairing, updating softwares and/or reinstalling operating systems on my old mobile phone because there are no such services provided.

20. I haven't tried repairing, updating softwares and/or reinstalling operating systems on my old mobile phone because such services are too expensive.

21. I haven't tried repairing, updating softwares and/or reinstalling operating systems on my old mobile phone because it's time consuming and inconvenient.

22. I haven't tried repairing, updating softwares and/or reinstalling operating systems on my old mobile phone because buying new mobile phone is cheap and easy.

23. I haven't tried repairing, updating softwares and/or reinstalling operating systems on my old mobile phone because it's beyond repair.

*(On the scale of 1 to 5, choose what is most applicable to you)*

1    2    3    4    5  
Disagree                      Agree

24. If mobile phone manufacturers and operators were to offer repair and refurbish services at a reasonable price, will you be interested to give it a try?

25. How much are you willing to pay for mobile phone repair and refurbish services (not including parts)? \*

- Less than 30
- 31 to 50
- 51 to 100
- 101 to 150
- More than 150

26. How many days do you think is reasonable for mobile phone repair and refurbish services?

- Less than 1 week
- 1 to 2 weeks
- 3 to 4 weeks
- More than 4 weeks

27. What type of mobile phone contract do you have with your mobile phone operator?

- Contract free
- 1 year
- 2 years
- 3 years



28. Does your mobile phone operator offer subsidies for new mobile phone purchase when renewing mobile phone contract?

- Yes
- No

\* numbers presented are either in Euros or Singapore dollars, depending where the respondents are currently residing.



## BIBLIOGRAPHY

147 /  
Utopia /  
Bibliography

Apple. "*Iphone 5: The biggest thing to happen to iPhone since iPhone.*" <http://www.apple.com/iphone/>. 2013.

Arbor, Ann. *Cell Phones All Contain Toxics: Older Ones the Most*. Michigan: Environment News Service, October 11 2012.

Berger, Warren. *Glimmer: How Design can Transform Your Business, Your Life, and Maybe Even the World*. London: Random House Business Books, 2009.

Blomström, Magnus et al.. *Growth And Innovation Policies For A Knowledge Economy: Experiences From Finland, Sweden, And Singapore*. Stockholm: Stockholm School of Economics, October 2002.

Brown, Tim. *Change by Design: How Design Thinking Transforms Organisations and Inspires Innovation*. United States of America: HarperCollins Publishers, 2009.

CBC News. "E-waste mounting in developing countries: UN." <http://www.cbc.ca/news/technology/story/2010/02/22/tech-e-waste-report.html>. February 22 2010.

Chan, Joshua et al.. *Cell Phone Industry Analysis*. Sacramento: California State University Sacramento, May 2006.

Chapman, Jonathan. *Emotionally Durable Design: Objects, Experiences and Empathy*. London: Earthscan, 2005.

Chaudhuri, Arjun. *Emotion and Reason in Consumer Behavior*, United States of America: Elsevier, 2006.

Dictionary.com. "Disposable income." <http://dictionary.reference.com/browse/disposable%20income?fromAsk=true&to=100074>.

Edwards, Andres R.. *The Sustainability Revolution: Portrait of a Paradigm Shift*. Canada: New Society Publishers, 2005.

Ehrenfeld, John R.. *Sustainability by Design: A Subversive Strategy for Transforming Our Consumer Culture*. United States of America: Yale University Press, 2008.

Eisenberg, Sheryl. "This Green Life: The 3R's Still Rule." Natural Resources Defense Council. <http://www.nrdc.org/thisgreenlife/0802.asp>. February 2008.

Entner, Roger. *International Comparisons: The Handset Replacement Cycle*. Recon Analytics, 23 June 2011.

Euromonitor International. "Statistic Reference, Country Factile: Finland." <http://www.euromonitor.com/finland/country-factfile>, <http://www.euromonitor.com/singapore/country-factfile>. Jan 2011.

Garner, Howard. *Changing minds: The Art and Science of Changing Our Own and Other People's Minds*. United States of America: Harvard Business School Press, 2006.

Greenpeace. "Greenpeace Guide to Greener Electronics." <http://www.greenpeace.org/international/en/campaigns/toxics/electronics/Guide-to-Greener-Electronics/>. November 2012.

Hindle, Tim. *The Economist: Guide to Management Ideas and Gurus*. London: Profile Books Ltd, 2008.

Hull, Eric V. *Poisoning the Poor for Profit: The Injustice of Exporting Electronic Waste to Developing Countries*. Duke Environmental Law & Policy Forum Vol. 21:1, 2010.

Klugman, Jeni et al.. *Human Development Report 2011, Sustainability and Equity: A Better Future for All*. New York: United Nations Development Programme, Palgrave Macmillan, 2011.

Kruger, D. J.. *Integrating Quantitative and Qualitative Methods in Community Research*. The Community Psychologist, 2003.

Lincoln, John D et al. *Leaching Assessments of Hazardous Materials in Cellular Telephones*. California: Department of Chemical Engineering and Materials Science, Public Health Program, College of Health Sciences, University of California, USA, Environmental Science & Technology Vol 41, No. 7, 2007.

London, Bernard. *Ending the Depression Through Planned Obsolescence*. 1932.

Market Information and Statistics Division, Telecommunication Development Bureau. *The World in 2010: ICT Facts and Figures*. Switzerland: International Telecommunication Union (ITU), 2010.

Metze, Marcel. *Anton Philips (1874 - 1951): They will know who they're dealing with*. Amsterdam: Balans Publishers, 2004.

Nokia, "Nokia 700 Eco profile." <http://i.nokia.com/blob/view/-/198844/data/3/-/700-Eco-profile-pdf.pdf>. August 2011.

Nokia, *Nokia Care Recycling Service Training*, Nokia, 2008.

Nokia. "Ota yhteyttä." <http://www.nokia.com/fi-fi/tuki/yhteystiedot/>. 2013.

Nokia. "Sustainable mobile products: Nokia Lumia 820." <http://www.nokia.com/global/about-nokia/people-and-planet/sustainable-devices/sustainable-devices/>. September 2012.

Nordbrand, Sara. *Out of Control: E-Waste Trade Flows from the EU to Developing Countries*. Sweden: SwedWatch, April 2009.

North Carolina State University. "The Industrial Revolution." <http://www4.ncsu.edu/unity/users/p/pwhmds/indrev.html>.

Pietikäinen, Johanna. *A Slow Start at the Beginning of the Recycling Chain: How to Make Consumers Recycle Their Mobile Phones?*. Helsinki: Master's Thesis of the Environmental Sciences, Department of Biological and Environmental Sciences, Faculty of Biosciences, University of Helsinki, 2007.

Pongrácz E, Phillips PS & Keiski RL. *From waste minimization to resources use optimization: Definitions and legislative background*. In: Pongrácz E (ed.) *Proceedings of the Waste Minimization and Resources Use Optimization Conference*. June 10th 2004, University of Oulu, Finland. Oulu University Press: Oulu, 2004.

Schluep, Mathias et al.. *Recycling – From E-Waste To Resources*. Berlin: Sustainable Innovation and Technology Transfer Industrial Sector Studies, United Nations Environment Programme & United Nations University, Oktoberdruck AG, July 2009.

Stockhammer, Philipp W.. *Performing the Practice Turn in Archaeology*. Heidelberg: Ruprecht-Karls-Universität Heidelberg, Transcultural Studies No 1, 2012.

Time Magazine. "CORPORATIONS: A Very Tough Baby." <http://www.time.com/time/magazine/article/0,9171,803625,00.html>. July 23 1945.

United Nations Environment Programme. "About Human Development." <http://hdr.undp.org/en/humandev/>.

Walker, Stuart. *Sustainable by Design: Explorations in Theory and Practice*. London: Earthscan, 2006

Wikipedia. "Planned obsolescence." [http://en.wikipedia.org/wiki/Planned\\_obsolescence](http://en.wikipedia.org/wiki/Planned_obsolescence). 22 February 2013.

Wikipedia. "Recycling." <http://en.wikipedia.org/wiki/Recycling>. 7 February 2013.

World Class Communications Technologies, LLC. *3 R's of Sustainability: Reduce Reuse Recycle*. World Class Communications Technologies, LLC, 2011.

Xavier, Patrick, PhD.. *Behavioural Economics And Customer Complaints In Communication Markets*. Australia: Australian Communications and Media Authority, May 2011.







